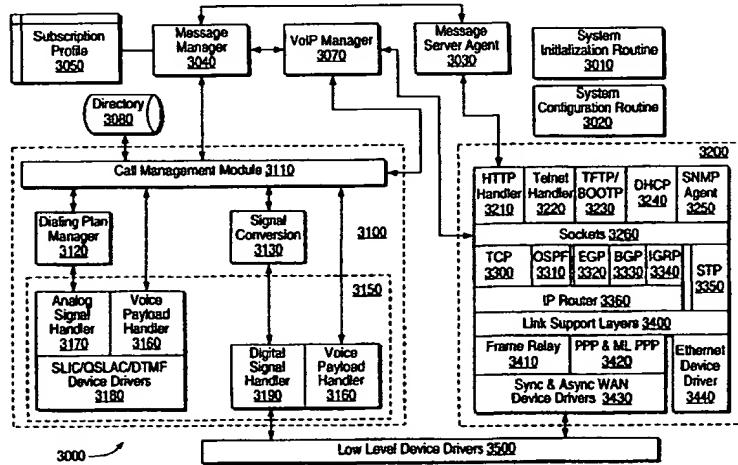




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(54) Title: TRANSMISSION OF AUDIO OR MULTIMEDIA INFORMATIONAL MESSAGES TO USERS**(57) Abstract**

Disclosed are a method, apparatus, and system for transmission of informational messages to users of aural communication devices. An apparatus according to the disclosure provides a small key telephone system and an internetworking facility. The internetworking facility can retrieve messages from a message server for storage in the apparatus. The messages may then be transmitted to users of the aural communication devices under control of the small key telephone system. A message may be provided before or after a dial tone is provided when a user desires to make an outgoing call. Also a message may be provided before establishment of a communication path when a user receives an incoming call. Further disclosed is configuring central office switching equipment to perform as the disclosed apparatus. A still further disclosed aspect is configuring cellular communications systems to perform as the disclosed apparatus. In another disclosed aspect, computer telephony systems either based on POTS telephony, etherphone telephony, or voice over IP telephony, provide more varied messages that may include multimedia.

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TRANSMISSION OF AUDIO OR MULTIMEDIA INFORMATIONAL MESSAGES TO USERS

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BACKGROUND OF THE INVENTION***FIELD OF THE INVENTION***

The invention relates generally to telephony and more particularly to devices and methods that integrate telephony and other messaging systems.

BACKGROUND

10 Information exchange plays a vital role in modern society and one that is of growing importance. For decades the telephone system has played a central role in information exchange.

Increasingly, the functions of traditional telephony are converging with other means for information exchange, such as computer networks. One result of this is that
15 users of equipment that integrates telephone and other functions have a richer set of communications possibilities available to them. Another result is that providers of networking services face increasing competition from businesses in many markets. A third result is that those who do not have the financial ability to purchase devices and services that provide integrated communications are at an even greater disadvantage in
20 our society than in prior times.

Accordingly, it would be desirable for there to be an invention that provided a means for network service providers to enhance their revenues. Further, it would be desirable for there to exist a system that enabled access to telecommunication services to be subsidized. Still further, it would be desirable for a solution to these problems to

be able to take advantage of the increased functions of telecommunication devices, such as personal computers.

Conventional systems are lacking in features desirable for achieving these, and other, capabilities of the invention. For instance, conventional voice mail systems provide a means for messages to be provided to a telephone user; some even provide a means for users to retrieve messages based on user preferences. However, such systems are not suitable for network service providers to develop a revenue-generating service model that allows a sponsor's criteria to be consulted when determining whether and/or which informational message(s) should be sent to a subscriber. By providing a means for sponsors to customize the transmission of informational messages to aural communication device users, versions of the present invention provide features desirable to sponsors that are lacking in conventional systems and therefore provide increased revenue opportunities for network service providers.

Other conventional systems operate by a user dialing a "1-800" number to begin interacting with the system; the user then typically navigates a menu of options, enters an identification number, is transmitted messages, and thereafter may begin to make their desired call. Such systems present unnecessary inconvenience to the user. It will be appreciated that from a sponsor's perspective, increased user time, effort, and confusion in interacting with a system for transmitting informational messages may foster negative associations in the user's mind with the sponsor's goods, services, etc. It is therefore desirable that user frustration be minimized; accordingly features of the present invention can archive a sponsor's goals of transmitting informational messages to aural communication device users without a user having to actively remember and dial a "1-800" to enter the system. Such "1-800" number-type systems effectively demand that a user complete two telephone calls in order to participate in the system. Particularly for telecommunications systems that cater to busy customers, such as cellular systems, this additional time spent to make what is, in effect, an additional call, may be a barrier to wide adoption of the system. Still further, such "1-

800" number systems lack the desirable feature of the present invention by which an informational message may be transmitted to a user of a cellular communication device during the interval of time after the user has entered the number to which they wish to be connected but before the communications path is established.

5 The aforementioned capabilities and other objects are obtained by a method, apparatus, and system for the transmission of audio or multimedia informational messages, such as advertisements or the like, to aural communication device users.

SUMMARY

An illustrative aspect of the present invention involves practicing a method for
10 providing at least one informational message to an aural communication device user in connection with an outgoing communication. One such method includes: detecting a first aural communication device is in use; retrieving a first informational message ; transmitting the first informational message to the first aural communication device for perception by the user; and providing an indication to the first aural
15 communication device that the first aural communication device is available for connection to a second aural communication device. The aural communication device may be, for instance, a conventional phone, a computer-telephony system, a packetized voice communication device (e.g. a Voice over IP phone), a computer programmed to provide a Voice over IP client, or a wireless communication device,
20 e.g. a cellular phone. The informational message may be transmitted before or after (or both) a dialing indication is provided to the aural communication device. Similarly, when a communication is incoming, informational messages may be transmitted to a user of the aural communication device after they place their aural communication device 'off hook' but before the incoming call is connected. The
25 informational message may be in audio form, textual form, or multimedia form according to the situation and the capabilities of the aural communication device. Informational messages used with some versions of the invention may be stored in

compressed form and be decompressed before transmission; similarly, informational messages used with some versions of the invention may be stored in text form and be converted to an audio form before transmission.

Another illustrative aspect of the invention is that the informational messages sent to the aural communication devices can be controlled based on a profile of a user, 5 a profile of a sponsor, or both. A user's profile may include, for instance positive or negative preferences, e.g., indications of the desire to be provided informational messages of a particular character or of the desire to not be provided informational messages of a particular character. A sponsor's profile may include, for instance, 10 demographic, psychographic, geographic, or socio-economic preferences, e.g., indications of particular attributes of subscribers to be targeted for transmission of informational messages.

Still another illustrative aspect of the invention is identity verification of a user. Versions of the invention may prompt a user to identify himself or herself by, 15 for instance, a personal identifier such as a PIN, or by a voice print. User identification information may be used in conjunction with user or sponsor profile(s) to provide a more customized selection of informational messages for the user. Reliable user identification may also operate with versions of the invention which invite commercial transactions and the user's identification used in conjunction with 20 payment arrangements.

Another aspect of some versions of the present invention provides interactive informational messages ("feedback"). Feedback messages may present a user with selectable options. The user may select from the selectable options and have an output generated automatically. The output may be another message, possibly an 25 electronic mail message, or another informational message. In some versions of the invention, the automated output may be a coupon that is sent to the user. The coupon may be sent to a merchant or other party for redemption by the user. In some versions

a selectable feedback option may be to be connected to another party such as a sponsor, merchant, etc. for additional information, electronic commercial transactions, etc. In other versions of the invention a selectable feedback option may be to establish a connection to a network resource, such as a web site, of a sponsor, merchant, etc.

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A still further illustrative aspect of the present invention involves practicing an apparatus for providing at least one informational message to a user of an aural communication device. An illustrative apparatus is configured for connection to at least one aural communication device and a data network, said apparatus and 10 includes: a processor; a memory communicatively coupled with the processor; and a network interface communicatively coupled with the processor. The network interface is configured for communication over the data network. The illustrative apparatus further includes a subscriber line interface communicatively coupled with the processor and a message agent, the message agent adapted to retrieve at least one informational message for storage in said memory. The at least one message may be communicated to the subscriber line interface under the control of the processor. 15 Such an apparatus provides the functions of a telephone system supporting several phone lines and a client operable with an internet-type network through which informational messages may be conveniently and flexibly retrieved thought client-server communications with a message server. Such an apparatus may, for instance, 20 be placed at a customer's premises or collocated with a central office switch.

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Another aspect of a version of the present invention involves configuring a central office switching system. An illustrative systems for providing informational messages to a user of aural communication device may include: a central switching system, the switching system routing voice telecommunications between at least a first aural communication device and a second aural communication device. The central switch is further configured for communicative coupling with a data network, and the system further includes a message server, the message server configured for

client-server communications with the switching system via said data network. The message server stores an informational message and the system further includes a message manager, the message manager configuring the switching system to request the informational message from the message server. The illustrative system further includes a call manager, the call manager configuring the switching system to perform steps comprising: receiving the informational message from said message manager; and transmitting the informational message to the first aural communication device.

Aspects of other versions of the invention may operate in a wireless communications network and provide a method for providing a textual, image, or multimedia informational message in conjunction with an incoming communication for an aural communication device. The aural communication device may have an associated identifier. Practicing an illustrative method according to the invention includes: receiving an indication of the incoming communication for the aural communication device; retrieving an informational message from a message server; establishing a data communication connection to the aural communication device; transmitting the informational message to the aural communication device; and thereafter establishing a connection to the aural communication device for the incoming communication. Retrieving an informational message from a message server may comprise: providing the identifier of the aural communication device to a message server; selecting an informational message responsive to the identifier; and retrieving the informational message selected responsive to the identifier. Selecting an informational message responsive to the identifier may also comprise: querying a subscription profile, the subscription profile comprising profile information for a subscriber, the subscriber associated with the identifier of the aural communication device; selecting an informational message responsive to the profile information; and retrieving the informational message selected responsive to the profile information.

Other illustrative aspects of the invention operable with cellular wireless communications provide a system for providing an informational message to a user of

a cellular aural communication device having an associated identifier. The illustrative system includes: a mobile switching system; a subscriber register, the subscriber register communicatively coupled with the mobile switching center, the subscriber register storing subscriber information, the subscriber register configured to receive a subscriber validation request from the mobile switching system and communicate a validation response to the mobile switching system, the validation response comprising a subscriber identifier; and a message server configured for client-server communication with the mobile switching system, the message server storing said informational message, wherein, in response to the initiation of an outgoing communication to a first phone number from the cellular aural communication device, the mobile switching system submits a validation request to the subscriber register, the mobile switching system receives a validation response from the subscriber register, the mobile switching system communicates a subscriber identifier to the message server, the message server communicates the informational message to the mobile switching system for transmission to the aural communication device.

Aspects of other versions of the invention may operate in a packet voice network in which the invention provides a method for providing informational messages to a user of aural communication device based on, for instance, voice over IP technology. Practicing an illustrative system includes: a voice over IP gateway resident in a central office or with head-end equipment in a cable network. The IP gateway routes voice communications between at least a first aural communication device, such as an IP phone, and a second aural communication device, such as a plain old telephone or an IP phone. The IP gateway is further configured for communicative coupling with a data network. Such a system further includes a message server, a message manager, and a call manager. The message server is configured for client-server communications with said gateway system via said data network, the message server further storing an informational message. The message manager configures the gateway system to request the informational message from the message server. The call manager configures the gateway system to perform steps

comprising: receiving said informational message from the message manager; and transmitting said informational message to the first aural communication device.

As will be further appreciated by this disclosure versions of the present invention provide a flexible integration of telephony and internetworking systems for the provision of informational messages to users of aural communication devices. Features of the invention allow rich messaging capabilities to be provided to users of computer telephony systems. Further, when informational messages used with the invention are advertisements or the like, versions of the invention provide a desirable means for networking service providers to increase their revenue by selling the opportunity to provide advertisements to aural communication device users. Such versions of the invention provide a service method and system which could greatly expand the access to aural communication technology for those of more modest means as service providers may subsidize the cost of providing telephony equipment and/or services with revenues gained from the provision of informational messages to aural communication device users.

BRIEF DESCRIPTION OF THE DRAWINGS

These and other features, aspects, and advantages of the present invention will become better understood with regard to the following description, appended claims, and accompanying drawings where:

- 20 Fig. 1A depicts a exemplary network architecture in which the invention may operate in accordance with an illustrative embodiment;
- Fig. 1B depicts a exemplary public switched telephone network in which the invention may operate in accordance with an illustrative embodiment;

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- Fig. 1C depicts additional features of the exemplary network architecture in which the invention may operate in accordance with an illustrative embodiment;
- Fig. 1D depicts an exemplary cellular network architecture in which the invention may operate in accordance with an illustrative embodiment;
- 5 Fig. 1E depicts an exemplary network architecture including an interactive voice response system with which the invention may operate in accordance with an illustrative embodiment;
- Fig. 2 depicts a block diagram of a hardware architecture in accordance with an illustrative embodiment;
- 10 Fig. 3 depicts a block diagram of a software architecture in accordance with an illustrative embodiment;
- Fig. 4 depicts a flow diagram of a method for outgoing communication message transmission in accordance with an illustrative embodiment;
- 15 Fig. 5A depicts a flow diagram of a method for communicating an AudioMT message in accordance with an illustrative embodiment;
- Fig. 5B depicts a flow diagram of a method for communicating a Feedback AudioMT message in accordance with an illustrative embodiment;
- 20 Fig. 6A depicts a flow diagram of a method for communicating an AudioTM message in accordance with an illustrative embodiment;
- 25

- Fig. 6B depicts a flow diagram of a method for communicating a Feedback AudioTM message in accordance with an illustrative embodiment;
- 5 Fig. 7 depicts a flow diagram for a method for communicating an AudioICM message in accordance with an illustrative embodiment;
- Fig. 8A depicts a flow diagram for a method for communicating an AudioTM message to a VoIP client or Etherphone in accordance with an illustrative embodiment;
- 10 Fig. 8B depicts a flow diagram for a method for communicating an AudioICM message to a VoIP client or Etherphone in accordance with an illustrative embodiment;
- Fig. 9 depicts a flow diagram of a method for communicating an AudioTM message in accordance with an illustrative cellular embodiment;
- 15 Fig. 10 depicts a flow diagram of a method for communicating a TextICM message in accordance with an illustrative cellular embodiment;
- Fig. 11 depicts a flow diagram of a method for communicating informational messages to a PC & phone in conjunction with an outgoing call in accordance with an illustrative embodiment;
- 20 Fig. 12 depict a flow diagram of a method for communicating informational messages to a PC & phone in conjunction with an incoming call in accordance with an illustrative embodiment;
- 25

- Fig. 13A depicts a flow diagram of a method for communicating an PopupM message to a VoIP client in conjunction with an outgoing call in accordance with an illustrative embodiment;
- 5 Fig. 13B depicts a flow diagram of a method for communicating a PopupM message to a VoIP client in conjunction with an incoming call in accordance with an illustrative embodiment;
- 10 Fig. 14 depicts a flow diagram of a method for communicating a feedback PopupM message to a computer/phone in conjunction with an outgoing communication in accordance with an illustrative embodiment;
- 15 Fig. 15 depicts a flow diagram of a method for communicating a feedback PopupM message to a computer/phone in conjunction with an incoming communication in accordance with an illustrative embodiment;
- Fig. 16 depicts a flow diagram of a method for alias dialing in accordance with an illustrative embodiment.

DETAILED DESCRIPTION OF THE INVENTION

NOTATIONS AND NOMENCLATURE

- 20 AudioMT An audio message that may be sent to an “ear piece” of an aural communication device before dial tone.
- AudioTM An audio message that may be sent to an “ear piece” of an aural communication device after or during dial tone.

	AudioICM	An audio message that may be sent to an “ear piece” of an aural communication device after an incoming call has been received.
5	TextICM	A Textual message that may be sent to a text display of an aural communication device before an incoming call; may also include image data.
10	Ring Back Tone	A special tone sent to a call originator that a destination aural communication device is ringing.
15	SLIC	Subscriber line interface circuit.
20	CPE	A customer premise equipment such as router, phone, key telephone system, FAD, modem, or broadband Integrated Access Device (IAD) etc. These devices may be used to connect subscribers to service providers' networks.
25	PopupM	A window or other display element in a computer system comprising a multimedia message.
20	Subscriber	A user who subscribes to a particular service provided by a service provider, e.g. a cellular phone subscriber, a Internet subscriber.
25	VoIP	“VoIP” stands for Voice over IP (Internet Protocol). It refers to a particular type of packetized voice communication technology that carries voice over packet oriented network(s) using the IP.
	VoIP Gateway	A Gateway which allows the devices using VoIP technology to inter-operate with traditional telephones and vice versa.

Etherphone “Etherphone” refers to a device that behaves like a telephone, but it is connected to a packet transport medium. Typically, the Internet Protocol is used; etherphones typically use a VoIP protocol for voice communication. Also known as IP phone.

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Multimedia message In addition to a standard meaning, the term ‘multimedia message’ includes, without limitation, single-media non-audio messages.

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DSLAM Digital Subscriber Line Access Multiplexor.

DESCRIPTION OF FIGURES

Fig. 1A depicts a exemplary network architecture 1000 in which illustrative embodiments invention may operate. An internet-type network 1100 is shown. Illustrative embodiments of the invention work with the Internet. Other networks using the Internet Protocol (“IP”), either public or private may also be used, as may networks which do not use the IP.

Addressable in the internet-type network 1100 are a first message server 1110 and a second message server 1120. The first message server 1110 and the second message server 1120 generally function, at least, to store text, audio, or multimedia messages that may be transmitted in accordance with versions of invention. Further, the first message server 1110 and the second message server 1120 may provide management and control of the messages sent to subscribers. In some embodiments of the invention they gather statistics respecting messages transmitted to subscribers. The first message server 1110 or the second message server 1120 may be computing machinery of a general nature configured to act as a server in client-server communications. An illustrative server may be a SPARC-based workstation from SUN MICROSYSTEMS of Mountain View, CA running the SOLARIS operating

system and the Apache HTTPd server software, e.g., a “web server.” Conveniently, the first message server **1110** or the second message server **1120** may be located at a service providers’ Point of Presence. One of skill will recognize that versions of the invention may operate with one or several servers.

5 Further illustrated is a public switched telephone network **1200**, commonly known as “PSTN.” Shown as part of the public switched telephone network **1200** are a first edge switch **1210** and a second edge switch **1240**. The first edge switch **1210** and the second edge switch **1240** typically are able to route voice calls to the public switched telephone network **1200** and internet traffic to the internet-type network **1100** including, for example, to the first message server **1110** or the second message server **1120**. As part of the public switched telephone network **1200**, the first edge switch **1210** is connected with a first central office switch **1220** and the second edge switch **1240** is connected with a second central office switch **1230**. Exemplary structures for the first edge switch **1210** or the second edge switch **1240** include, for example, Intelligent DSL Multiplexors, Multiservice Switches, ATM Edge Switches, Cable Modem Head-end Equipment and analogous equipment recognized as suitable in the art. Structures suitable for the first central office switch **1220** or the second central office switch **1230** include, for example, a carrier grade PBX switch and/or SS7 switch.

10 15

20 Referring now to the first edge switch **1210** as illustrative of the second edge switch **1240** as well, the first edge switch **1210** is connected to a first CPE device **1400**. The first CPE device **1400** may be an apparatus embodying aspects of the invention as will be described below. Typically functions of the first CPE device **1400** in accordance with illustrative embodiments include, access to the public switched telephone network **1200** and the internet-type network **1100** and control of one or more phone lines.

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Shown connected with the first CPE device **1400** are a first set of aural communication devices **1500** including a first POTS phone **1510**, a first coupled PC & phone **1520**, and a first VoIP client **1530**. The first coupled PC & phone **1520** or the first VoIP client **1530** may communicate with the first CPE device **1400** via a first LAN **1540**. Any of the first set of aural communication devices **1500** may be used with the first CPE device **1400** in accordance versions of the invention as will be described below.

Also shown are a second set of aural communication devices **1600** including a second POTS phone **1610**, a second coupled PC & phone **1620**, and a second VoIP client **1630**. The second coupled PC & phone **1620** and the second VoIP client **1630** may communicate with a second CPE device **1300** via a second LAN **1640**. A first user may use one of the first set of aural communication devices **1500** to initiate a call to, or receive a call from, a second user operating one of the second set of aural communication devices **1600**. During the period in which the first user and the second user operate their respective aural communication devices, either or both may be transmitted an informational message by their respective CPE devices in accordance with versions of the invention as will be described below.

Fig. 1A also depicts a set of aural communication devices directly connected to a central office switch **1700** including a third POTS phone **1710** which also may be transmitted an informational message in some versions of the invention.

In some versions of the invention, the first CPE device **1400** is an integrated access device (“IAD”) while in others it may be that, for example, the first central office switch **1220** has been suitably modified to perform functions and embody features of the invention. One of skill in the art having the benefit of this disclosure will recognize numerous structures of programmed or programmable logic capable of being suitably configured to perform functions according to versions of the invention.

Some versions of the invention could readily operate with VoIP Gateways, and it is contemplated that the invention will be independent of the underlying protocols used with the VoIP devices and VoIP Gateways. Fig. 1C depicts additional features of the exemplary network architecture in which the invention may operate in accordance with illustrative embodiments. For clarity of organization, some features of the exemplary network architecture 1000 described in connection with Fig. 1A are also depicted in Fig. 1C. Fig. 1C further illustrates a first VoIP gateway 1800 and a second VoIP gateway 1825 that are communicatively connected with the first central office switch 1220 and the second central office switch 1230, respectively. Connected between the VoIP Gateway and the subscribers may be a transport medium multiplexor, such as a DSLAM, Modem Banks, or Cable Head-end equipment. Alternatively, these functions may be integrated in the VoIP Gateway. For convenience, a DSLAM is used in this illustrative embodiment, as the particular transport medium multiplexor is not fundamental to the illustrative embodiment. A first DSLAM 1850 and a second DSLAM 1875 are also depicted. The first DSLAM 1850 may communicate with the first VoIP gateway 1800 and the first message server 1110; the second DSLAM 1875 may communicate with the second VoIP gateway 1825 and the second message server 1120.

Illustrative VoIP embodiments may be appreciated with reference to Fig. 1C by one of skill in the art who, also having the benefit of this disclosure, will apprehend how various other embodiments could be practiced. A converting computer 1555 is depicted as well as a POTS phone connected through a converting computer 1550. The converting computer 1555 may be configured to convert the signaling of a POTS phone to VoIP transmissions for communication to the first VoIP gateway 1800 via the first DSLAM 1850.

Also depicted is a first VoIP client programmed computer 1560. The first VoIP client programmed computer 1560 may be connected to a first DSL equipment 1565 and the first DSL equipment 1565 may connect to the first DSLAM 1850. The

first DSL equipment **1565** may be a DSL modem, or suitable customer premises equipment configured to perform the functions of a DSL modem. A user may use a speaker and microphone operatively coupled with the first VoIP client programmed computer **1560** to engage in VoIP communications according to many software and 5 communications protocol configurations. Some embodiments use the NetMeeting application from Microsoft Corp. of Redmond, WA, U.S.A. that may employ the H.323 protocol, many other suitable applications are commercially available. Additionally depicted is a VoIP PC & phone **1570** connected to the first DSL equipment **1565**. Elements of the VoIP PC & phone **1570** may be used separately or 10 in conjunction.

In some embodiments, a VoIP phone **1665** is connected to a second DSL equipment **1660**. The second DSL equipment **1660** is, in turn, connected to the second DSLAM **1875**. In other embodiments, a POTS phone **1670** is connected to a VoIP converter **1675** that converts the signaling to VoIP transmissions. The VoIP converter **1675** may then be connected to the second DSL equipment **1660**. A second 15 VoIP programmed computer **1680** is also depicted and illustrates that various embodiments of the invention may be employed with one, or plural, parties to a aural communication communicating with VoIP systems.

Fig. 1D depicts an exemplary cellular network architecture **1900** in which the 20 invention may operate in accordance with an illustrative embodiment. A mobile unit **1905** is shown. The mobile unit **1905** may be, for instance, a conventional cellular phone that supports text communication, personal digital assistant or computer with cellular communication capabilities, or other cellular-type communication device that supports text communication.

Several base transceiver stations **1903** provide a connection interface for the 25 mobile unit **1905**. The base transceiver stations **1903** are controlled by a base station controller **1910** ("BSC") that is responsible for call hand over operations. Further

depicted is a mobile switching center 1920 ("MSC") that is responsible for setting up, managing, and clearing connections, as well as routing calls to an appropriate cell site. The mobile switching center 1920 also provides linkage to a signal transfer point 1980 ("STP") that may use SS7 protocols to provide signaling information required to establish circuit connections and disconnection with the public switched telephone network 1200, as well as database retrieval from, and data sharing with, another entity. The mobile switching center 1920 communicates with cell sites through the base station controller 1910.

The mobile switching center 1920 further communicates with a home local register 1930 ("HLR"), a visitor location register 1950 ("VLR"), and an operation and maintenance center 1940 comprising an equipment identity register 1960 ("EIR") and an authentication center 1970. The home local register 1930 is a database that stores the subscriber information for all subscribers within the home service area of the service provider. The visitor location register 1950 stores information about visiting subscribers who are not in their home service area including, for example, roaming number information, so that subscribers may use their cellular phones while in another city. The equipment identity register 1960 stores the identification serial number of all cellular telephones activated within the coverage area while the authentication center 1970 stores a security key embedded into cellular phones. Both the equipment identity register 1960 and the authentication center 1970 are used for user authentication, activation and detection, and other operational and maintenance purposes.

Further depicted in Fig. 1D is a message server 1990 such as the first message server 1110 or the second message server 1120. The message server 1990 may be collocated with the home local register 1930 so that when a user places a call from the mobile unit 1905 an identifier, such as the serial number in a cellular phone or phone identification, is transmitted from the mobile unit 1905 to one of the base transceiver stations 1903. This information is then passed to the mobile switching center 1920.

When the message server 1990 is collocated with the home local register 1930, The mobile switching center 1920 may also communicate with the message server 1990 after the mobile switching center 1920 validates the calling phone number with the home local register 1930. Operation of aspects of the invention that may employ the exemplary cellular network architecture 1900 is discussed in greater detail below in connection with Fig. 9 and Fig. 10.

Various embodiments of the invention provide a telephone switching systems such as, for instance, key telephone switching systems, PBX systems, VoIP Gateways or the like. In accordance with various embodiments of the invention, a conforming telephone switching system may operate, for instance, with a PSTN, a Cellular network, or a Cable Network. One embodiment illustrative of various features of the invention is a device that has the characteristics of a key telephone system, an Internet access router, and a voice over IP gateway. However, to one of skill in the art, the teachings of this disclosure set forth other embodiments as well; and various alterations, modifications, omissions of elements are also within the grasp of one skilled in the art having the benefit of this disclosure. As one of skill in the art will recognize from the following descriptions, an apparatus with hardware and software architecture such as that of the illustrative versions of the invention described below may be an IAD. In addition to 8 telephone connections, and an Ethernet LAN connection towards the customer side the IAD may have a T1/E1 interface or a HDSL interface to a network. The apparatus may act as a small key telephone system, providing all the necessary functions of conventional plain-old telephone usage and a router for access to the internet-type network 1100.

As noted, in some embodiments the first CPE device 1400 is an IAD and Fig. 2 illustrates a block diagram of a hardware architecture of an illustrative IAD embodying aspects of the invention. The hardware architecture 2000 includes a microprocessor subsystem 2100, a memory subsystem 2200, a network interface subsystem 2300, a set of subscriber interfaces 2400, and a set of user interfaces 2500.

The microprocessor subsystem **2100** comprises a MPC860 microprocessor **2110**, an address bus **2120**, a data bus **2130**, a memory controller **2140** and an DMA controller **2150**. The microprocessor subsystem **2100** typically also includes conventional supporting circuitry including, for example, a power, reset, debug port, and clock circuits (not shown). The MPC860 microprocessor **2110** is a commercially available MPC860 microprocessor from Motorola. Conveniently, the MPC860 includes an integrated Ethernet Media Access Controller ("MAC"). Embodiments that use the MPC860 conveniently configure the data bus **2130**, the memory controller **2140**, and the DMA controller **2150** according to Motorola's SAMBA Reference Design Board for the MPC860 processor.

The memory subsystem **2200** is communicatively coupled with the microprocessor subsystem **2100**. The memory subsystem **2200** comprises an DRAM subsystem **2210** and a flash memory subsystem **2220**. The flash memory subsystem **2220** may be implemented with four Advanced Micro Devices 29F800 (1M x 8) flash memory devices arranged as a 32-bit wide memory bank. The MPC860 microprocessor **2110** may access the memory subsystem **2200** through a glueless interface consisting of signals from the address bus **2120** and the data bus **2130**, and control signals from the memory controller **2140**. These signals are connected to the flash memory devices through a set of 3.3V-5V voltage translation buffers (not shown), to alleviate signal loading on the MPC860 microprocessor **2110**. The MPC860 microprocessor **2110** accesses to the flash memory subsystem **2220** are controlled by chip-select CS0 of the memory controller **2140**.

The network interface subsystem **2300** is communicatively coupled with the microprocessor subsystem **2100**. The network interface subsystem **2300** includes a field programmable gate array **2310** and a set networking ports **2350** that includes an HDSL port interface **2320**, a T1/E1 port interface **2330**.

The field programmable gate array **2310** manages multiplexing and routing of voice and data streams (or combined voice and data streams) over one or more of the set networking ports **2350**. The T1/E1 port interface **2330** may be implemented with a Dallas Semiconductor DS2152 Enhanced T1 Transceiver device available from Dallas Semiconductor of Dallas, Texas, U.S.A.. The DS2152 may be configured to support a variety of formats such as D4, ESF, and SLC-96. An external processor such as the MPC860 microprocessor **2110** accesses the DS2152's internal control and status registers through its parallel bus interface (not shown). The interface to the MPC860 microprocessor **2110**'s bus may be in the Motorola non-multiplexed mode.

5 In alternative embodiments in which an E1 interface is desired, the T1/E1 port interface **2330** may be implemented with a Dallas Semiconductor DS2154.

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A suitable structure for the HDSL port interface **2320** is an HDSL chip set from Metalink that comprises one MtH2430BL, two MtH2410AL and two MtH2445 processors that may be designed according to the Metalink reference design (all 15 available from Metalink, Ltd. of Tel Aviv, Israel).

In some embodiments an ADSL port interface may be added to the set networking ports **2350**. Many suitable ADSL chip sets are commercially available, one example is from Motorola. One of skill will recognize many other commercially available suitable structures and designs.

20 In some embodiments a Cable Modem interface may be added to the set networking ports **2350** (or optionally in lieu of the HDSL port interface **2320**). A suitable Cable Modem interface may be implemented with, for instance, the BCM330-QAMLINK chipset from Broadcom Corp. of Irvine, California. Conveniently, in embodiments comprising a Cable Modem interface, a device so 25 configured may communicate with Cable head-end equipment. When configured for communication with Cable head-end equipment features of the invention may conveniently be embodied in a 'set-top box'.

The set of user interfaces **2500** comprises a set of subscriber interfaces **2400**, a RS-232 port **2510**, an ethernet transceiver **2430**, and a UTP port **2440**. The set of subscriber interfaces **2400** comprises a pair of QSLACs **2410**, a set of four SLICs **2420**, and a set of four DTMF detectors **2450**. The set of user interfaces **2500** may 5 provide the function of a “plain old telephone system” (POTS) interface, an Ethernet LAN interface, and an RS-232 interface.

The POTS interface function may be implemented by the pair of QSLACs **2410** which may be Advanced Micro Devices Am79Q02 QSLAC. Each of the pair of QSLACs **2410** may drive a set of four SLICs **2420**. The set of four SLICs **2420** may 10 be Advanced Micro Devices Am7920 SLICs (available from Advanced Micro Devices, Sunnyvale, California, U.S.A). The set of four SLICs **2420** are connected to the set of four DTMF detectors **2450** and a power supply (not shown). Each of the set of four SLICs **2420** provides DC current to send voice signals to a telephone (not shown) connected with a two-wire line. Further each of the set of four SLICs **2420** 15 manages the TIP and Ring leads of the telephone line interface, detects the off-hook status of a connected telephone, and works with the power supply and a ringing relay to switch the ringing signal on or off to the connected telephone. Each of the pair of QSLACs **2410** processes digital PCM voice data into analog signals and inputs them to one or more of the set of four SLICs **2420**. In the transmit path, the analog output 20 of one of the set of four SLICs **2420** is processed by the QSLAC device and output in serial digital format to the PCM interface.

The Ethernet LAN interface may be implemented with a LXT970 10/100 ethernet transceiver **2430** available from Level One Communications of Sacramento, California, U.S.A. Conveniently the ethernet transceiver **2430** may be interfaced with 25 the integrated MAC of the MPC860 microprocessor **2110**. The ethernet transceiver **2430** communicates through the UTP port **2440**. The design of the LXT970’s analog interface to the UTP port **2440** may be as in the LXT970’s databook. The LXT970 ethernet transceiver **2430** interfaces to the MPC860 microprocessor **2110** via its

Media Independent Interface, (MII). The MPC860 microprocessor **2110** MII signals are implemented on its Port D pins and four other pins that are defined as spare pins on the MPC860 microprocessor **2110**.

The RS-232 port **2510** may be centered on a SMC1 communication port of the 5 MPC860 microprocessor **2110**. The SMC1 port may be used as a low-speed serial link for a resident ROM monitor. The design of this port comprises a Maxim 3232 RS-232 transceiver that converts SMC1's transmit and receive signals, to RS-232 levels.

Also depicted is a digital signal processor **2600** communicatively coupled with 10 the microprocessor subsystem **2100**. The digital signal processor **2600** may operate with versions of the invention to provide digital audio signal generation for particular messages.

Fig. 3 depicts a block diagram of a software architecture **3000** that may 15 operate with the hardware architecture **2000** in an illustrative version of the invention . The software architecture **3000** includes a system initialization routine **3010**, a system configuration routine **3020**, a Key/PBX module **3100**, an internet communication module **3200**, a message server agent **3030**, a message manager **3040**, and a VoIP manager **3070**.

The system initialization routine **3010** performs conventional system 20 initialization functions. The system configuration routine **3020** allows a user or network operators to configure parameters used in conjunction with operation of the device such as the phone line numbers, an IP address for the device, an access speed to the network, etc.

In addition the system configuration routine **3020** allows configuration of a 25 subscription profile **3050**. The subscription profile **3050** may specify, for example, a service type for users associated with the aural communication device to which a

device embodying aspects of the invention may communicate informational messages. The subscription profile 3050 may control, for example, a number of times which an informational message will be transmitted to an aural communication device. The subscription profile 3050 may also comprise a profile for a sponsor or for a user associated with an aural communication device to which the device transmits informational messages. The system configuration routine 3020 may configure the subscription profile 3050 in addition to conventional parameters used in conjunction with operation of the device.

The internet communication module 3200 includes a set of WAN device drivers 3430. The set of WAN device drivers 3430 include both synchronous or asynchronous communications protocols. The set of WAN device drivers 3430 communicate with a set of low level device drivers 3500 that drive the chipsets of the T1/E1 port interface 2330, the HDSL port interface 2320, or Cable Modem interface. The set of WAN device drivers 3430 passes data to a frame relay services module 3410 and a PPP / ML PPP services module 3420. The frame relay services module 3410, the PPP / ML PPP services module 3420, and an Ethernet device driver 3440 provide link layer functions. A set of link support layers 3400 supports the link layer function and provides data to network layer modules such as an IP router module 3360 and an STP module 3350. The STP module 3350 implements the Spanning Tree Bridging Protocol that provides an IEEE 802-compliant MAC layer bridging engine containing both port state control and frame filtering/forwarding. The IP router module 3360 implements the functions of a conventional Internet Protocol router. Suitable implementations are widely available commercially including from RouterWare of Newport Beach, CA, U.S.A. A TCP module 3300 provides transport layer functions and several routing protocol modules, such as an OSPF module 3310, an EGP module 3320, an BGP module 3330, and an IGRP module 3340 exchange routing information from the IP router module 3360 with gateways in other systems.

A socket layer **3260** provides an IP address and “port” for application layer modules to communicate with lower layers. Exemplary application layer modules include an SNMP agent **3250**, a DHCP module **3240**, a TFTP/BOOTP module **3230**, a Telnet handler **3220**, and an HTTP handler **3210** that operate conventionally.

5 The HTTP handler **3210** operates with a message server agent **3030**. The message server agent **3030** communicates with a message server such as the first message server **1110** or the second message server **1120**. In one embodiment of the invention, when an IAD is to be installed, an installer provides the IAD with the URL of a message server. Upon the IAD powering up and establishing a valid network
10 connection, the IAD communicates an HTTP Open Connection Request to the message server. The message server transfers one or more informational messages, to the IAD where they are stored, for example in the memory subsystem **2200**. The message server agent **3030** may also periodically communicate an HTTP Open Connection Request to the message server and next communicate an HTTP Post
15 Request to transfer logs and/or statistics gathered by the IAD relating to the informational messages transmitted by the IAD to various aural communication devices. In some embodiments, the message server agent **3030** may initiate a request to open a connection with the message server responsive to status of the subscription profile **3050**. The message server agent **3030** may then transfer one or more
20 informational messages to the IAD.

Turning now to the Key/PBX module **3100** of the software architecture **3000**, the Key/PBX module **3100** includes a call management module **3110**, a Key/PBX driver module **3150**, a dialing plan manager **3120**, and a signal conversion module **3130**.

25 The Key/PBX driver module **3150** works with hardware described in connection with Fig. 2. A set of device drivers **3180** operate with the pair of QSLACs **2410**, the set of four SLICs **2420**, and the set of four DTMF detectors **2450**. When the

set of device drivers **3180** detect an “off hook” condition for a phone connected to one of the set of four SLICs **2420**, the set of device drivers **3180** coordinates operation of a ringing circuit, assembles DTMF tone digits, and generates various tones. The dialing plan manager **3120** communicates with an analog signal handler **3170** and a voice payload handler **3160**.

The analog signal handler **3170** communicates with the set of four SLICs **2420** and the pair of QSLACs **2410** to provide analog signaling handling including, for instance, Key Telephone System (“KTS”) signaling, and Off Premise Extension (“OPX”) signaling. The analog signal handling typically includes handling of “off hook” status of a connected analog aural communication device, such as the first POTS phone **1510**, ringing of the phone, dialing tone generation, and ring back tone generation. In addition, the analog signal handler **3170** operates with the set of four DTMF detectors **2450** to translate the DTMF tones to dialing digits.

The voice payload handler **3160** programs the pair of QSLACs **2410** and assembles PCM information stream into packetized form. In addition, the voice payload handler **3160** may provide jitter buffering of the voice payload based on an estimated round trip delay. In some versions, the pair of QSLACs **2410** operates with the digital signal processor **2600** to provide echo cancellation in the audio pathway. In other versions, an echo cancellation chipset such as TECO3264 from Lucent Technologies of Murray Hills, New Jersey may provide echo cancellation. As will be described further below, some versions of the messages are decompressed and/or undergo text-to-speech conversion. In embodiments when decompression or text-to-speech conversions is required, the voice payload handler **3160** coordinates the decompression or text-to-audio conversion with the digital signal processor **2600** and the microprocessor subsystem **2100**.

The dialing plan manager **3120** provides conventional dialing management functions, including, assembling the number of dialing digits, managing an inter-digit

time-out timer, managing the total duration of dialing time, and managing the maximum number of dialing digits allowed.

The call management module **3110** generally manages the state of the incoming and outgoing calls and provision of informational messages. For instance, 5 during an incoming call in the analog case, a user picks up a handset that triggers the analog signal handler **3170** to indicate that the phone is off-hook. This information is passed to the call management module **3110** via the dialing plan manager **3120**. The call management module **3110** may then consult a message manager **3040** with the line identification of the user's line to determine if an informational message should 10 be communicated for perception by the user (as will be described in detail below).

If a call is an extension call to another analog line under the control of the system, the call management module **3110** generates a signal with the line identification to the analog signal handler **3170** to indicate there is a call for that particular line. This triggers the analog signal handler **3170** to exert ringing to the line. 15 When a user answers the phone, the analog signal handler **3170** detects this phone as "off hook," and informs the call management module **3110** that the call has been answered. The call management module **3110** then connects the two lines and puts the path to voice payload transfer mode.

The call management module **3110** additionally may consult a directory database **3080** to determine how the call should be switched based on portion (or all) 20 of the dialing digits. In some embodiments, the directory database **3080** is an internal pre-configured table that is used to route the phone calls based on hierarchy digits. However, this is not fundamental, and in other embodiments routing information could reside on a server accessed through a directory protocol including, for instance, 25 the Lightweight Directory Access Protocol ("LDAP"). (When LDAP is used, a suitable protocol stack should be integrated, as one of skill will appreciate).

An IAD according to some embodiments of the invention supports TDM based access to PSTN including, for instance, T1 through the T1/E1 port interface 2330. In these embodiments, the call management module 3110 may check, for instance, the directory database 3080 to determine if the call is should be routed to the PSTN. If the call should be routed to the PSTN via the T1 the T1/E1 port interface 2330 using, for instance, CAS signaling, the call management module 3110 allocates an appropriate time slot (if available) for the call and converts the analog call signaling to CAS signaling. Thereafter, the call management module 3110 places the call with the dialing digits as the phone number to the PSTN.

10 An additional aspect of some versions of the invention is routing of calls over the internet-type network 1100 as a Voice over IP (“VoIP”) call. When VoIP call routing is used, the call management module 3110 communicates with a VoIP manager 3070. The call management module 3110 passes the dialing digits to the VoIP manager 3070.

15 The VoIP manager 3070 then initiates the call in accordance with a suitable VoIP standard. In some embodiments of the invention the H.323 VoIP standard is used as promulgated by the International Telecommunication Union (“ITU”) of Geneva, Switzerland. If H.323 is desired, an H.323 protocol stack available from Radvision of Tel Aviv, Israel, may be used. The particular VoIP protocol used is not fundamental to the present invention and it is contemplated that the invention will operate with VoIP protocols other than H.323 (now known or later created) according to the particular commercial and/or technical needs of the situation. During a VoIP call, the call management module 3110 may maintain the call status state throughout the call, and interact with the VoIP manager 3070 appropriately.

20 25 The VoIP manager 3070 additionally manages the conversion of internal call control signaling to signaling format in compliance with a voice over IP standard. In some embodiments a Gatekeeper (as proposed in the ITU-T H.323 specification) is

not implemented. The directory database **3080** may be used in place of the Gatekeeper as a simple database for the address conversion from dialing digits to IP address format; LDAP access may also be used.

5 In some embodiments providing VoIP, the G.711 audio codec is used. In addition, some embodiments employ the User Datagram Protocol (“UDP”) network layer for the speech payload transfer over the internet-type network **1100**.

10 The message manager **3040** may look at the line identification, which is passed to it by the call management module **3110**, and check with the subscription profile **3050** to determine whether an AudioMT should be sent to that particular line in the case of a call initiated through a phone connected to the IAD. In the event an incoming call is received from the PSTN to a line connected to the IAD, the call management module **3110** will determine the line identification based on the 15 incoming call information. (E.g. in the case of DID, a specific number is associated with a specific line. If it is rotary, then the call management module **3110** will assign the call to a particular line that is free.) The line identification is sent to the message manager **3040**, which in turn checks with the subscription profiles to determine whether an AudioICM should be sent to that line. If needed, the message manager **3040** will retrieve the message and pass it to the call management module **3110** which in turn passes it to the voice payload handler **3160**.

20 The call management module **3110** implements message transmission features in various embodiments of the invention. Aspects of illustrative embodiments will be described in connection with Fig. 4 through Fig. 16 below. Briefly here, the call management module **3110** operates with a message manager **3040** to coordinate the transmission of informational messages to users of aural communication devices 25 under control by an IAD.

As will be described in detail below, an apparatus according to illustrative versions of the invention may be, for example, the first CPE device **1400** and may

access message servers such as the first message server **1110** to retrieve informational messages which may be stored, for example in the DRAM subsystem **2210**, for later communication to, for example, one of the first set of aural communication devices **1500** under its control. Call management as described below allows the apparatus to transmit informational messages, including advertisements or the like, to aural communication devices under its control.

ILLUSTRATIVE EMBODIMENTS

Features of various versions of the invention will now be provided for further illustration. One of skill in the art will appreciate that the following embodiments are illustrative of the invention and that various modifications, omissions, and alterations may be made without departing from the scope and spirit of the invention as set forth in the appended claims. Reference will be made to **Fig. 1A–Fig. 1D** in describing illustrative embodiments with the understanding that the illustrative embodiments are not limited to the configurations of **Fig. 1A–Fig. 1D**.

15

1. PHONE CONNECTED TO PUBLIC SWITCH INFRASTRUCTURE THROUGH A CPE

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In some embodiments of the invention the first POTS phone **1510** is connected to the public switched telephone network **1200** with the first CPE device **1400**. The first CPE device **1400** may be an IAD with hardware and software architectures as described in connection with **Fig. 2** and **Fig. 3**.

1.A. OUTGOING COMMUNICATION HANDLING

For purposes of illustration of outgoing communication handling, a first user operating the first POTS phone **1510** is assumed to be making an outgoing

communication to a second user operating one of the second set of aural communication devices **1600**.

Fig. 4 depicts a flow diagram of an 'outgoing communication message transmission' method **4000** in accordance with an illustrative embodiment. The first CPE device **1400** may implement aspects of the 'outgoing communication message transmission' method **4000**. Processing initiates at a 'start' terminal **4025** and one of the set of four SLICs **2420** generates an 'indication the first POTS phone **1510** is 'off hook' **4050**. The set of device drivers **3180** receive a signal from one of the set of four SLICs **2420** that is passed to an "off hook" detection process **4075** in the analog signal handler **3170** that detects the signal and provides an indication thereof to the call management module **3110**.

Next, an 'AudioMT to first user' decision process **4125** involves the call management module **3110** consulting the message manager **3040** to determine whether an AudioMT should be sent to the first POTS phone **1510** at this time. The message manager **3040** examines the line identification, which is passed to it by the call management module **3110**, and may consult a subscription profile **3050** associated with the first POTS phone **1510** or the AudioMT to determine whether to send the AudioMT.

The subscription profile **3050** may comprise records commonly used by advertisers or marketers in customizing their messages including, for example, a frequency with which the AudioMT is to be communicated, a class or group of users to which the AudioMT is to be communicated, and temporal limits on when the AudioMT should be communicated. The temporal limits may indicate particular times during the day when the AudioMT should or should not be communicated, and may also indicate the expiry of a 'lifespan' associated with the AudioMT.

If the AudioMT should be communicated to the first aural communication device, the 'AudioMT to first user' decision process **4125** exits through its 'yes'

branch to enter an 'AudioMT retrieval' process **4150**. The 'AudioMT retrieval' process **4150** is performed by the message manager **3040** and retrieves the AudioMT from the DRAM subsystem **2210**.

Process flow continues to a 'feedback AudioMT' decision process **4175** performed by the message manager **3040**. Some embodiments of the invention operate with informational messages that offer feedback or interactive ("feedback") options to a user. In some embodiments, the informational messages convey to the user feedback options. For example, a user may hear, "Press star-1 to learn more; press start 2 to receive a coupon for this item, or press star-3 to speak with an operator to participate in a promotion . . ." Some embodiments include an indication in a header portion of the informational message indicating whether the informational message will present feedback options to the user. The 'feedback AudioMT' decision process **4175** detects whether the AudioMT retrieved in the 'AudioMT retrieval' process **4150** indicates that it will present feedback options. If so, the 'feedback AudioMT' decision process **4175** exits through its 'yes' branch and process flow continues to a 'feedback AudioMT communication' process **4300** that will be described below in connection with **Fig. 5B**. If the AudioMT retrieved in the 'AudioMT retrieval' process **4150** does not indicate that it will present feedback options, the 'feedback AudioMT' decision process **4175** exits through its 'no' branch and process flow continues to an 'AudioMT communication' process **4200** that will be described below in connection with **Fig. 5A**.

From either the 'AudioMT communication' process **4200** or the 'feedback AudioMT communication' process **4300** process flow continues to a 'remaining messages' decision process **4400** that consults the message manager **3040** and determines whether one or more additional AudioMTs should be sent. If additional AudioMTs should be sent, the 'remaining messages' decision process **4400** exits through its 'yes' branch and process flow returns to the 'AudioMT retrieval' process **4150** for another iteration. When no additional AudioMTs should be sent, the

'remaining messages' decision process **4400** exits through its 'no' branch and process flow continues to the 'outgoing call handling' process **4425**. The call management module **3110** performs the 'outgoing call handling' process **4425** and instructs the analog signal handler **3170** to provide an indication that the first POTS phone **1510** is available for connection to one of the second set of aural communication devices **1600**, typically a conventional dial tone. Ingress digits are typically then received from the first POTS phone **1510** and handled by the call management module **3110** to initiate a call.

Process flow continues to an 'AudioTM to first user' decision process **4450** that involves the call management module **3110** consulting to the message manager **3040** determine whether to send an AudioTM to the first POTS phone **1510** in a fashion analogous to that described above in connection with the 'AudioMT to first user' decision process **4125**. If the AudioTM should be communicated to the first aural communication device, the 'AudioTM to first user' decision process **4450** exits through its 'yes' branch to enter an 'AudioTM retrieval' process **4475**. The message manager **3040** performs the 'AudioTM retrieval' process **4475** that retrieves the AudioTM from the DRAM subsystem **2210**. Process flow continues to a 'feedback AudioTM' decision process **4500** that (similar to the 'feedback AudioMT' decision process **4175**) will detect if the AudioTM is a feedback AudioTM. If so, the 'feedback AudioTM' decision process **4500** exits though its 'yes' branch to enter a 'feedback AudioTM communication' process **4600**; if not, the 'feedback AudioTM' decision process **4500** exits through its 'no' branch and process flow enters an 'AudioTM communication' process **4700**. The 'AudioTM communication' process **4700** and the 'feedback AudioTM communication' process **4600** will be described in detail below in connection with **Fig. 6A** and **Fig. 6B**, respectively.

Process flow continues to a 'remaining messages' decision process **4800** that consults the message manager **3040** and determines whether one or more additional AudioTMs should be sent. If additional AudioTMs should be sent, the 'remaining

messages' decision process 4800 exits through its 'yes' branch and process flow returns to the 'AudioTM retrieval' process 4475 for another iteration. When no additional AudioMTs should be sent, the 'remaining messages' decision process 4800 exits through its 'no' branch and process flow continues to the 'call establishment handling' process 4825.

The 'call establishment handling' process 4825 performs conventional steps to establish the communication path to one of the second set of aural communication devices 1600 familiar to one of skill in the art. Briefly, the dialing plan manager 3120 assembles the number of dialing digits and passes them the call management module 3110. The call management module 3110 then checks the directory database 3080 to see how to route the call. Assuming, for example, the communication is to route through the T1/E1 port interface 2330 to the public switched telephone network 1200, the call management module 3110 sets up a logical path and sends out a connection request through the call management module 3110. The call management module 3110 determines an appropriate digital interface signaling protocol. If CAS signaling, the call management module 3110 assigns a time slot (DS0) and invokes signal conversion to initiate the ABCD bit according to the connection signaling protocol. If PRI ISDN interface, the call management module 3110 performs according to the PRI ISDN specification. If the remote is not busy, the call management module 3110 maintains the logical path, and establishes the voice payload transfer state. During the communication, the call management module 3110 passes back and forth the voice payload between the calling and called party. This typically includes the handshakes (such as hearing the remote phone is ringing, the remote handset is picked up – off hook) before the speech path is fully connected. If the remote is busy, the call management module 3110 generates a busy tone to the first POTS phone 1510. If the number is invalid the call management module 3110 generates a fast busy tone. Process flow completes through an 'end' terminal 4900.

The 'AudioMT communication' process 4200 will now be described in greater detail. **Fig. 5A** depicts a flow diagram of a method communicating an AudioMT in accordance with an illustrative embodiment. The 'AudioMT communication' process 4200 initiates at 'start' terminal 4205 and process flow continues to a 'compressed message' decision process 4220 performed by the voice payload handler 3160. The 'compressed message' decision process 4220 exits through its 'yes' branch if the AudioMT is in compressed form and a 'decompression' process 4230 decompresses the AudioMT. Process flow continues to a 'text to audio' decision process 4240 that exits through its 'yes' branch if the AudioMT is in textual form and should be converted to audio. A 'text to audio conversion' process 4250 performs the conversion. The 'decompression' process 4230 and the 'text to audio conversion' process 4250 may operate conventionally with the digital signal processor 2600 to perform their functions. Process flow continues to an 'AudioMT transmission' process 4260 that transmits the AudioMT in audio form to the first POTS phone 1510 for perception by the first user. Process flow continues to a 'messages sent' flag setting' process 4280 that sets an internal flag indicating that a message has been sent and process flow completes through an 'end' terminal 4290.

The 'feedback AudioMT communication' process 4300 will now be described in more detail with reference to **Fig. 5B**. Some embodiments of the invention support interactive informational messages (termed "feedback"). Process flow initiates at a 'start' terminal 4305 and continues to a 'compressed message' decision process 4315 performed by the voice payload handler 3160. The 'compressed message' decision process 4315 exits through its 'yes' branch if the AudioMT is in compressed form and a 'decompression' process 4320 decompresses the AudioMT. Process flow continues to a 'text to audio' decision process 4325 that exits through its 'yes' branch if the AudioMT is in textual form and should be converted to audio. A 'text to audio conversion' process 4330 performs the conversion. The 'decompression' process 4320 and the 'text to audio conversion' process 4330 may operate conventionally with the digital signal processor 2600 to perform their functions. Process flow continues to a

'feedback AudioMT transmission' process 4335 that begins transmitting the AudioMT in audio form to the first POTS phone 1510 for perception by the first user.

Next, a 'AudioMT feedback indication' decision process 4340 detects if the message sent to the user requires a feedback from the user. If so, then the user is prompted to provide a feedback indication. For instance, an AudioMT may offer one or more feedback options along with associated indications the user may make to select among the one or more feedback options. Generally, the type, quality, and nature of feedback options are only limited by the capabilities of the aural communication device being used. Illustrative versions of the invention are described 5 below; one of skill in the art will appreciate various modifications, alterations and adaptations of the illustrative embodiments that still lie within the spirit and scope of 10 the invention as set forth in the appended claims.

In some illustrative versions, prompting for feedback input is similar to that found with conventional voice mail systems, e.g. "press 1 for to speak with an 15 operator to learn more; press 2 to participate in a promotion; press 3 to receive a catalog; press 4 to proceed to make your original call . . ." Advertisers or other providers of informational messages may customize the particular message and feedback option prompting to their liking.

When a user provides the dialing sequence for a feedback option, one of the 20 set of four DTMF detectors 2450 detects the tone sequence, converts it to binary and provides the binary sequence to the call management module 3110. The 'AudioMT feedback indication' decision process 4340 exits through its 'yes' branch and the call 25 management module 3110 couples the information with a line identity, and other information such as a message identifier, IAD identifier to form a feedback indication message. Process flow continues to a 'feedback indication storage' process 4350 that passes the feedback indication message to the message server agent 3030 for communication to the message server. Such information may be logged by message

servers, used to generate usage profiles of subscribers, used to determine pricing of informational messages, and other information collation, and customization operations with which one of skill in the art is familiar.

5 Process flow continues to a 'call redirection' decision process **4355**. Some AudioMTs may prompt the user to have a call placed ("redirected call") to a third party including, for instance, a sponsoring entity. Some embodiments place the redirected call upon receipt of the user feedback indication while others place the redirected call after the user completes their outgoing call.

10 The call management module **3110** upon receiving the user feedback selection determines if the selection is for a redirected call. In some embodiments, the AudioMT also includes one or more fields comprising selections and associated redirected call numbers. In other embodiments, the call management module **3110** may receive a response message from the message server comprising the number to dial for the redirected call. Still other embodiments use "alias dialing". With alias 15 dialing the user may be prompted to use a word, mnemonic, acronym, etc. created by the letters found on telephone keypad, e.g. "press star ITX to speak with the ITX Networks operator" where "star ITX" corresponds to the "*", "4", "8", "9" keys on a conventional telephone keypad. The alias may correspond to the number that should be dialed to complete the redirected call.

20 In still other embodiments, alias dialing may be used whenever the user begins using their aural communication device. In these embodiments, when the user places their aural communication device "off hook" and begins to enter a dialing sequence, the call management module **3110** in an IAD, CPE, or central office switch can detect an alias from the dialing sequence and place a call to a target number for which the 25 alias is word, mnemonic, acronym etc. The conversion from the alias name to the target telephone number may be a simple table look up, or a directory call conversion or a message exchange with the message server. This feature allows a feedback

message to prompt a user, for instance, "Dial star ITX at any time to reach ITX Networks" and the user may pick up their aural communication device at some time and use this alias to reach ITX Networks. Further description of alias dialing is provided below with reference to **Fig. 16**.

5 Returning to **Fig. 5B**, the 'call redirection' decision process **4355** exits through its 'yes' branch if the call management module **3110** determines that the selected feedback involves a call being placed to a third party. A 'redirected call' process **4360** executes in which the call management module **3110** places the call.

10 If the 'feedback AudioMT transmission' process **4335** determines that the selected feedback does not involve a call being placed to a third party and process flow continues to an 'automated output' decision process **4365**.

15 The 'automated output' decision process **4365** determines whether the selected feedback option involves automated output generation. If so process flow continues to an 'output generation' process **4370**. The 'output generation' process **4370** involves the call management module **3110** posting to the message server the feedback selection and also comprises the message server generating the automated output.

20 In some embodiments, the automated output may be an email message sent to an address associated with the user of the aural communication device. The message may be, for instance, a promotion, coupon, or other information inviting a commercial transaction. The automated output may be mail sent by conventional postal methods, in which case the message server would provide an indication to, for instance, a human operator to send the mail. In still other embodiments, the automated output may be a coupon redeemable at a merchant. The message server may provide the information necessary to prepare the coupon directly to the merchant for the user to pick up from the merchant and redeem. The user may be provided (via their aural communication device, electronic mail, or otherwise) with an identification number or personal code to identify himself or herself at the merchant in order to redeem the

coupon . This feature of some embodiments of the invention allows the great volumes of conventional commercial mail in paper form sent to residences to be substituted with coupon provision according to embodiments disclosed herein. In still other embodiments, the automated output is not sent to the user but may be sent to another person. In yet other embodiments, the automated output may be a next informational message sent to the user's aural communication device. The next informational message may prompt the user to select from additional feedback options.

From the 'output generation' process 4370 process flow continues to an 'output communication' process 4375 in which the output from the 'output generation' process 4370 is communicated to the appropriate recipient. From the 'output communication' process 4375 or the 'redirected call' process 4360 process flow continues to a 'remaining feedback' decision process 4380. The feedback options presented to a user may provide for a next feedback option selection after the user has selected a first feedback option and completed a first feedback process. If the 'remaining feedback' decision process 4380 detects that a next feedback option has been selected, it exits through its 'yes' branch and a 'next feedback message selection' process 4385 executes. The 'next feedback message selection' process 4385 involves the call management module 3110 consulting a message server for the next feedback message. Process flow continues to a 'next feedback message communication' process 4390 in which the next feedback message is transmitted to the aural communication device and process flow returns to the 'feedback indication storage' process 4350 for another iteration.

When the 'remaining feedback' decision process 4380 exits through its 'no' branch, indicating no remaining feedback options are to be presented, or if no feedback indication is required during the 'AudioMT feedback indication' decision process 4340, process flow continues to a 'messages sent flag setting' process 4395 that sets an internal flag that the AudioMT has been sent and process flow completes through an 'end' terminal 4399.

The 'AudioTM communication' process 4700 will now be described in greater detail. Fig. 6A depicts a flow diagram of a method communicating an AudioTM in accordance with an illustrative embodiment. Process flow initiates at a 'start' terminal 4705 and continues to a 'compressed message' decision process 4715. If the 5 AudioTM is compressed, a 'compressed message' decision process 4715 exits through its 'yes' branch and a 'decompression' process 4720 decompresses the AudioTM. Process flow continues to a 'text to audio' decision process 4725 that exits through its 'yes' branch if the AudioTM is in text form and should be converted to audio. A 'text to audio conversion' process 4730 performs the conversion. The 'text 10 to audio conversion' process 4730 and the 'decompression' process 4720 may operate conventionally with the digital signal processor 2600 to perform their functions. Process flow continues to a 'AudioTM transmission' process 4740 that begins transmission of an AudioTM in audio form to the first POTS phone 1510 for perception by the first user.

15 Next, a 'destination ring back tone detected' decision process 4745 exits through its 'yes' branch if the ring back tone has been detected from one of the second set of aural communication devices 1600. If so, a 'set Ring Back Tone flag' process 4750 sets a flag indicating that the ring back tone has been detected. Process flow 20 continues to a 'destination answered' decision process 4755 that exits through its 'yes' branch if the call has been answered by one of the second set of aural communication devices 1600.

If the 'destination answered' decision process 4755 exits through its 'yes' branch, a 'set Call Answered flag' process 4760 sets a flag indicating that the call has 25 been answered. Process flow continues from here to a 'set Messages Sent flag' process 4770 that sets a flag indicating that a message has been sent and process flow completes through an 'end' terminal 4790.

If the 'destination answered' decision process 4755 exits through its 'no' branch, process flow continues to a 'Ring Back Tone flag set' decision process 4765 that determines if the flag indicating that a ring back tone has been detected is set. If so, the 'Ring Back Tone flag set' decision process 4765 exits through its 'yes' branch and a mixed AudioTM and Ring Back Tone transmission' process 4780 acoustically mixes the ring back tone and the AudioTM for transmission to the first POTS phone 1510 and process flow returns to the 'AudioTM transmission' process 4740. If the 'Ring Back Tone flag set' decision process 4765 determines that the flag indicating that a ring back tone has been detected is not set, it exits through its 'no' branch and process flow continues to a 'time expired' decision process 4775. The 'time expired' decision process 4775 determines whether a time limit in which the line is permitted to ring has expired. No particular time limit is fundamental to the features of the invention. If the time limit has not expired, process flow continues to the 'AudioTM transmission' process 4740 to continue transmission of the AudioTM. When the time limit expires, the 'time expired' decision process 4775 exits through its 'yes' branch and process flow completes through the 'end' terminal 4790.

The 'feedback AudioTM communication' process 4600 will now be described in more detail with reference to Fig. 6B. The 'feedback AudioTM communication' process 4600 is similar to the 'feedback AudioMT communication' process 4300. Process flow initiates at a 'start' terminal 4605 and continues to a 'compressed message' decision process 4615 performed by the voice payload handler 3160. The 'compressed message' decision process 4615 exits through its 'yes' branch if the AudioTM is in compressed form and a 'decompression' process 4620 decompresses the AudioTM. Process flow continues to a 'text to audio' decision process 4625 that exits through its 'yes' branch if the AudioTM is in textual form and should be converted to audio. The 'text to audio conversion' process 4630 performs the conversion. The 'decompression' process 4620 and the 'text to audio conversion' process 4630 may operate with the digital signal processor 2600. Process flow

continues to a 'feedback AudioTM transmission' process **4635** that transmits the AudioTM in audio form to the first POTS phone **1510** for perception by the first user.

Unlike the 'feedback AudioMT communication' process **4300**, in the 'feedback AudioTM communication' process **4600**, when the 'feedback AudioTM transmission' process **4635** executes and user feedback processing occurs, the dial tone to the aural communication device conveniently is suppressed. This is indicated by a 'dial tone suspension' block **4637**.

Process flow within the 'dial tone suspension' block **4637** is similar to that in the 'feedback AudioMT communication' process **4300**.

A 'feedback indication' decision process **4640** detects whether the message sent to the user requires a feedback from the user, then the user will be prompted for the feedback. When a user provides the dialing sequence for a feedback option, one of the set of four DTMF detectors **2450** detects the tone sequence, converts it to binary and provides the binary sequence to the call management module **3110**. The 'feedback indication' decision process **4640** exits through its 'yes' branch and the call management module **3110** couples the information with a line identity, and other information such as a message identifier, IAD identifier to form a feedback indication message. Process flow continues to a 'feedback indication storage' process **4650** that passes the feedback indication message to the message manager **3040** for communication to the message server. Such information may be logged by message servers, used to generate usage profiles of subscribers, used to determine pricing of informational messages, and other information collation, and customization operations with which one of skill in the art is familiar. Process flow continues to a 'call redirection' decision process **4655** that exits through its 'yes' branch if the call management module **3110** determines that the selected feedback involves a call being placed to a third party. A 'redirected call' process **4660** executes in which the call management module **3110** places the call.

If the 'call redirection' decision process **4655** determines that the selected feedback does not involve a call being placed to a third party process flow continues to an 'automated output' decision process **4665**. The 'automated output' decision process **4665** determines whether the selected feedback option involves automated output generation. If so process flow continues to an 'output generation' process **4670**.
5 The 'output generation' process **4670** involves the call management module **3110** posting to the message server the feedback selection and also comprises the message server generating the automated output. The automated output may be, for instance, of the type described above in connection with the 'feedback AudioMT
10 communication' process **4300**.

From the 'output generation' process **4670** process flow continues to an 'output communication' process **4675** in which the automated output generated by the 'output generation' process **4670** is communicated to the appropriate recipient. From the 'output communication' process **4675** or the 'redirected call' process **4660** process
15 flow continues to a 'remaining feedback' decision process **4680**. The feedback options presented to a user may provide for next feedback option selection after having selected a first feedback option and completed a first feedback process. If the 'remaining feedback' decision process **4680** detects that a next feedback option has been selected, it exits through its 'yes' branch and a 'next feedback message selection'
20 process **4685** executes. The 'next feedback message selection' process **4685** involves the call management module **3110** consulting a message server for the next feedback message. Process flow continues to a 'next feedback message communication' process **4690** in which the next feedback message is transmitted to the aural communication device and process flow returns to the 'feedback indication storage' process **4650** for
25 another iteration.

When the 'remaining feedback' decision process **4680** exits through its 'no' branch, indicating no remaining feedback options are to be presented, or if no feedback indication is required during the 'feedback indication' decision process **4640**,

process flow continues to a 'messages sent flag setting' process 4695 that sets an internal flag that the AudioMT has been sent. Process flow continues to a 'dial tone generation' process 4697 where the call management module 3110 issues a command to provide dial tone to the user. The user may then enter a dialing sequence and process flow completes through an 'end' terminal 4699.

5

The various feedback and options and embodiments discussed above in connection with the 'feedback AudioMT communication' process 4300 are equally operable with the 'feedback AudioTM communication' process 4600. That description is applicable to the 'feedback AudioMT communication' process 4300 and is provided by referring the reader to the discussion above.

10

1.B. INCOMING COMMUNICATION HANDLING

15

For purposes of illustration of incoming communication handling a second user operating the second POTS phone 1610 is assumed to be receiving an incoming communication from a first user operating one of the first set of aural communication devices 1500.

Fig. 7 depicts a flow diagram of an AudioICM communication method 7000. The second CPE device 1300 implements aspects of AudioICM communication method 7000 in this illustrative embodiment.

20

Process flow initiates at a 'start' terminal 7010 and continues to receive an 'incoming call' data block 7020 indicating that an incoming communication has been received from the public switched telephone network 1200. Next, a 'ring and ring back tone generation' process 7030 activates one of the set of four SLICs 2420 in the second CPE device 1300 to ring the second POTS phone 1610. The 'ring and ring back tone generation' process 7030 may also generate a ring back tone to the one of

25

the first set of aural communication devices 1500 initiating the incoming communication to indicate that the receiving phone is ringing.

Next, a 'call answered' decision process 7040 exits through its 'no' branch if the call has not been answered by the second POTS phone 1610 and a 'ring limit' decision process 7050 determines if a number of allowable rings has been exceeded. 5 If not, the 'ring limit' decision process 7050 exits through its 'no' branch and process flow returns to the 'call answered' decision process 7040. If the allowable number of ring has been exceeded, the 'ring limit' decision process 7050 exits through its 'yes' branch to enter a 'set No Answer flag' process 7060. The 'set No Answer flag' 10 process 7060 sets a flag indicating the call was not answered and the AudioICM communication method 7000 completes through an 'end' terminal 7070.

If the call is answered by the second POTS phone 1610, the 'call answered' decision process 7040 exits through its 'yes' branch and processing continues to an 'AudioICM to second user' decision process 7080. The 'AudioICM to second user' 15 decision process 7080 may consult a subscription profile to determine whether an AudioICM should be sent as has been described above in connection with AudioMTs and AudioTMs. If the AudioICM should not be transmitted, the 'AudioICM to second user' decision process 7080 exits through its 'no' branch and the AudioICM communication method 7000 completes through the 'end' terminal 7070.

20 If an AudioICM is to be transmitted, the 'AudioICM to second user' decision process 7080 exits through its 'yes' branch and a 'retrieve AudioICM' process 7090 retrieves the AudioICM from the memory subsystem 2200. Next, if the AudioICM is compressed, a 'compressed message' decision process 7100 exits through its 'yes' branch and a 'decompression' process 7110 decompresses the AudioICM. Process 25 flow continues to a 'text to audio' decision process 7120 that exits through its 'yes' branch if the AudioICM is in text form and should be converted to audio. A 'text to audio conversion' process 7130 performs the conversion. The 'decompression'

process 7110 and the ‘text to audio conversion’ process 7130 may operate conventionally with the digital signal processor 2600 to perform their functions. Process flow continues to an ‘AudioICM transmission’ process 7140 that transmits the AudioICM in audio form to the second POTS phone 1610 for perception by the 5 second user and begin a next iteration.

Process flow continues to a ‘remaining messages’ decision process 7150. If a next AudioICM is not to be transmitted the ‘remaining messages’ decision process 7150 exits through its ‘no’ branch and the AudioICM communication method 7000 completes through the ‘end’ terminal 7070. If a next message is to be transmitted the 10 ‘remaining messages’ decision process 7150 exits through its ‘yes’ branch and a ‘continue Ring Back Tone’ process 7160 executes. In some versions, the ‘continue Ring Back Tone’ process 7160 provides the Ring Back Tone to the originator of the incoming communication. In some other versions, the ‘continue Ring Back Tone’ process 7160 sends a call connected message to the switching system to indicate that 15 the incoming communication has been accepted and thereafter a message may be sent to the first user indicating the first user that his or her call is connecting with the second user. The message indicating that his or her call is connecting with the second user may be substituted by, or accompanied with, an informational message such as has been described above in connection with Part I.A. From the ‘continue Ring Back 20 Tone’ process 7160 process flow returns to the ‘retrieve AudioICM’ process 7090 to retrieve the next AudioICM.

2. ***VOICE OVER IP CLIENT, ETHERPHONE,
OR REGULAR PHONE CONNECTED
THROUGH CONVERTER TO FUNCTION
AS A VOICE OVER IP PHONE
CONNECTED THROUGH A VOIP
GATEWAY***

5

***2.A. GATEWAY AT CUSTOMER
PREMISES***

In some embodiments of the invention the first VoIP client 1530 is connected
10 to the internet-type network 1100 through a gateway located at a customer's premises.
In these embodiments a conventional gateway is modified to include programmed or
programmable logic for the transfer of message files from a message server to the
VoIP gateway (and suitable memory for storage of the transferred files). In addition,
the call management module 3110 is modified to provide suitable incoming and
15 outgoing communication handling of AudioTM and AudioICM messages. Handling
of AudioMT messages is analogous to the processes described in connection with **Fig.**
4, Fig. 5A, and Fig. 5B.

For purposes of illustration of outgoing communication handling a first user
operating the first VoIP client 1530 is assumed to be sending an outgoing
20 communication to a second user operating one of the second set of aural
communication devices 1600.

Some embodiments of the invention handle VoIP communication transport
(both incoming and outgoing). Some of these embodiments may comprise the
hardware architecture 2000 of **Fig. 2** and the software architecture 3000 of **Fig. 3** in an
25 IAD. Others of these embodiments may comprise software configuring conventional
central office switching hardware or PBX systems to perform functions of (all or part
of) the hardware architecture 2000 and the software architecture 3000.

Some VoIP handling embodiments use the ITU H.323 protocol, although as noted above, the particular protocol is not fundamental. One of skill art, having the benefit of this disclosure, will appreciate how features and advantages of the invention may be obtained with other VoIP protocols as well. For illustration, H.323
5 Gatekeepers will not be discussed as they, too, are not fundamental to practicing the invention.

Some VoIP handling embodiments perform functions of conventional VoIP Gateway communication handling. In some embodiments of the invention, ITU-T Q.931 is the ISDN user network interface layer 3 specification for basic call control.
10 When a Gateway is implemented between an IP infrastructure and the public switched telephone network 1200, the H.225 call signaling may be converted to the appropriate Q.931 signaling when a PRI ISDN digital interface is used. Such an implementation may use T1 CAS signaling to interface with PSTN as per the T1 specification (AT & T PUB 43801).

15 When an endpoint (a first user) initiates a call, call setup takes place using the call control messages defined in H.225. A receiving endpoint sends an Alerting message to indicate that the called party (a second user) has been alerted of an incoming call. In the case of a Gateway, the receiving endpoint sends the Alerting message when it receives a ring indication from the PSTN. In accordance with the current H.323 specification, if the endpoint can respond to a Setup message with a Connect, Call Proceeding, or Release Complete within 4 seconds, it need not required to send the Alerting message. An end-point sending the Setup message can expect to receive either an Alerting, Connect, Call Proceeding, or Release Complete message within 4 seconds after successful transmission.
20

25 With reference to Fig. 3, the VoIP manager 3070 receives the Call Setup Message from a Transport Service Access Point. In some embodiments, the Transport Service Access Point is to the internet-type network 1100 via a dedicated Frame Relay

connection. The IP packets may be encapsulated in the Frame Relay packet according to RFC 1490. This then goes through the data protocol stack and becomes an IP packet, i.e. a Call Setup Message to the VoIP manager 3070. The VoIP manager 3070 may then interact with the call management module 3110 to determine if there is a 5 POT line available for this incoming call. If there is a line available for the incoming call, the VoIP manager 3070 sends a Call Proceeding message to the client endpoint.

Fig. 8A depicts a flow diagram for a method for communicating an AudioTM message to a VoIP client or Etherphone in accordance with an illustrative embodiment. Process flow initiates at an 'start' terminal 8100 in response to an 10 incoming call signal from the first VoIP client 1530 being detected by the gateway. Call establishment occurs as described above.

Next, a 'send AudioTM to first user' decision process 8200 determines if an AudioTM is to be sent to the first user. If not, the 'send AudioTM to first user' decision process 8200 exits through its 'no' branch and process flow completes 15 through an 'end' terminal 8500.

If an AudioTM is to be sent, process flow continues to the 'send Call Accepted' process 8300 sends a signal from the gateway to the first VoIP client 1530 to indicate that the call signal has been accepted. The signal may be, for instance, a Connect Message according to the H.225 protocol. Processing continues to an 20 'AudioTM communication' process 8400. The 'AudioTM communication' process 8400 then executes in a fashion analogous to the 'AudioTM communication' process 4700 or the 'feedback AudioTM communication' process 4600 of Fig. 4. Processing completes through an 'end' terminal 8500.

Incoming communication handling will now be described. For purposes of 25 illustration of incoming communication handling a second user operating the second VoIP client 1630 is assumed to be receiving an incoming communication from a first user operating one of the first set of aural communication devices 1500.

5

Fig. 8B depicts a flow diagram for a method for communicating an AudioICM message to a VoIP client or Etherphone in accordance with an illustrative embodiment. Process flow initiates at a ‘start’ terminal **8600** and continues to a ‘send AudioICM to second user’ decision process **8700** that determines if an AudioICM should be sent to the second user. If not, the ‘send AudioICM to second user’ decision process **8700** exits through its ‘no’ branch and processing completes through an ‘end’ terminal **8950**.

10

If an AudioICM should be sent, the ‘send AudioICM to second user’ decision process **8700** exits through its ‘yes’ branch to a “Call Accepted” received’ decision process **8800**. The “Call Accepted” received’ decision process **8800** determines if a ‘Call Accepted’ signal has been received from the second VoIP client **1630**. When the ‘Call Accepted’ signal is received, the “Call Accepted” received’ decision process **8800** exits through its ‘yes’ branch and process flow continues to an ‘AudioICM communication’ process **8900**. The ‘AudioICM communication’ process **8900** then executes in a fashion analogous to the AudioICM communication method **7000** of Fig. 7. Processing completes through an ‘end’ terminal **8500**.

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2.B. GATEWAY AT CENTRAL OFFICE

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In some embodiments, the VoIP gateway is not located at a customer’s premises and may be located, for instance, at a central office. Reference may be made to **Fig. 1C** for an exemplary network topology in which such embodiments may be deployed. In accordance with such embodiments, the aural communication device may be, for instance, a computer programmed to provide a VoIP client such as the second VoIP programmed computer **1680**, an IP phone such as the VoIP phone **1665**, or a conventional phone connected through a converter and working as an IP phone, such as the POTS phone **1670** and the VoIP converter **1675**.

25

Generally, when the VoIP gateway is at a central office, practicing versions of the invention is similar to that described above in connection with VoIP gateways at

customer premises. Differences may be illustrated in connection with the second VoIP programmed computer **1680** as an illustrative embodiment.

The second VoIP programmed computer **1680** may be a conventional PC running the WINDOWS operating system from Microsoft and NetMeeting client software. The second VoIP programmed computer **1680** may have a built-in modem (analog or digital) for access to the internet-type network **1100**. The second VoIP programmed computer **1680** may also operate with a conventional phone going through a converter and then connected to the second VoIP programmed computer **1680** through, for instance, an Ethernet interface, Universal Serial Bus, IEEE 1394 serial bus, PCI bus, or other suitable means. Speakers and a microphone are operatively coupled with the second VoIP programmed computer **1680** to act as the ear and mouth pieces of a phone. The NetMeeting software converts audio and voice into H.323 compliant IP format. This information is communicated through the modem and to the second DSLAM **1875** or a Remote Access System ("RAS"), e.g. a conventional modem bank or Cable Head-end system (not shown). The second DSLAM **1875**, RAS, or Cable Head-end communicates the information to the second VoIP gateway **1825** that may follow the H.323 protocol to determine routing. If routing to the public switched telephone network **1200** is needed, the second VoIP gateway **1825** performs necessary conversion between VoIP signaling and PSTN voice.

In this situation, programmed instructions may configure the second VoIP gateway **1825** to embody aspects of, and perform methods according to, versions of the invention illustrated and described herein. Typically this may involve, at least, providing capability to transfer messages to and from message servers and local storage for messages retrieved from message servers. AudioMT, AudioTM, and AudioICM transmission may be provided as described above with reference to the processes in Fig. 4–Fig. 7 by suitably modifying the call management module **3110** as one of skill in the art will readily appreciate having the benefit of this disclosure.

However, when a simulated dial tone is not provided by the second VoIP gateway **1825**, AudioMT is not supported. AudioTM and AudioICM transmission are provided as described above in connection with embodiments where the VoIP gateway is located on a customer's premises.

5 In some embodiments, the invention may operate with speaker verification system. The speaker verification system may include a phone control interactive voice response ("IVR") system and a voice/key server. One illustrative embodiment may be understood with reference to **Fig. 1E** where IVR systems are shown on the side of the VoIP gateways of **Fig. 1C** (omitted in **Fig. 1E** for clarity). Shown in **Fig. 1E** are a first phone/key IVR **1250**, a second phone/key IVR **1260**, a first voice/key server **1150**, a second voice/key server **1160**. Suitable structures for these systems are commercially available and the PhoneKey system from ITT Industries of San Diego, California and its partner Buytel of Dublin, Ireland, may be used. The first phone/key IVR **1250** communicates with the first central office switch **1220**, the first message switch **1270**, and the first voice/key server **1150**. The second phone/key IVR **1260** analogously communicates with the second central office switch **1230**, the second message switch **1280**, and the second voice/key server **1160**. In operation, when a user of, for instance the VoIP phone **1665**, initiates a call, the second central office switch **1230** will route the call to the second phone/key IVR **1260** for speaker verification based on the subscription profile for the line associated with the VoIP phone **1665**. The second phone/key IVR **1260** prompts the user to verify his or her identification by speaking a particular phrase, e.g., the user's name, a personal identification number, or other suitable phrase. The second phone/key IVR **1260** then consults subscriber records accessible through the second voice/key server **1270** to determine if the spoken particular phrase can be verified as associated with a particular subscriber, i.e. the "voice print" matches. If so, validation information is returned from the second phone/key IVR **1260** to the second central office switch **1230** and the call continues as if it were originated from a phone connected to the public switched telephone network **1200**. In alternative embodiments, a user may

prompted to identify themselves by entering an identifier such as personal identification number ("PIN") rather than with an IVR system.

As described above with reference to **Fig. 1E**, the second phone/key IVR 1260, for instance, is shown connected to the second central office switch 1230, i.e., on the PSTN side of the VoIP gateway. Alternatively, VoIP gateways, as shown in 5 **Fig. 1C**, may be configured to detect if a caller is initiating a call from a line associated with a particular class of subscribers. The VoIP gateway could then route the call to a particular location in the public switched telephone network 1200; thereafter the user's identification could be verified using one of the above-described 10 means.

Whatever the means of user identification verification, once the user's identification is verified, additional features of the invention may be conveniently deployed. For instance, a more personalized messaging experience may be provided to the user by selection of informational messages responsive to demographic, 15 psychographic, or socio-economic information in the user's subscription profile. Further, user identification verification facilitates the consummation of voice-based commercial transactions as the known user's identification more reliably secures payment of a price. In some embodiments a feedback message may prompt a user to enter into a commercial transaction, the user's identification could be verified using 20 means described above, and the price the user agrees to pay in the commercial transaction could be added to the user's periodic bill from the service provider. One of skill in the art will appreciate that these features of the invention are not limited to embodiments using VoIP communications.

3. ***AURAL COMMUNICATION DEVICE
CONNECTED TO PBX OR KEY
TELEPHONE SYSTEM BEFORE
CONNECTED TO CPE***

5 In some embodiments of the invention one of the first set of aural communication devices **1500** is connected to a PBX or Key Telephone System before it is connected to the first CPE device **1400** (through a gateway). In these 10 embodiments the first CPE device **1400** does not have direct control over the first POTS phone **1510** and accordingly does not support transmission of AudioMT messages. Other features of previously described embodiments may still operate 15 when the first POTS phone **1510** is connected to a PBX or Key Telephone System before it is connected to the first CPE device **1400**.

In some embodiments when the first POTS phone **1510** is connected to a PBX or Key Telephone System, the signaling format may need to be modified. For an 15 analog trunk type connection, E&M signaling format is suitable. In the case of a digital trunk connection, suitable signaling formats include, for example, T1 (or E1) running ISDN PRI and an appropriate signaling format supported by the PBX; in the case of T1, this may be CAS.

20 4. ***PHONE DIRECTLY CONNECTED TO THE
CENTRAL OFFICE SWITCH***

Some embodiments of the invention involve a phone, such as the third POTS phone **1710** directly connected to a central office switch, such as the first central office switch **1220**.

25 In some embodiments software operating the central office switch is modified to implement the functions of the call management module **3110**, the message server agent **3030**, and the message manager **3040** as has been previously described. In

addition, a network connection between the central office switch and a message server is established. The message server may be on a public network such as the internet or may be on a private network. The precise location of the message server in a network topology is not fundamental.

5 In a modern PSTN network, a typical network architecture is shown as in Fig. 1B. The public switched telephone network 1200 may rely on SS7 as the basic infrastructure needed for a service switching point 1210 ("SSP"), which provides the local access as well as an ISDN interface for a signaling transfer point 1220 ("STP").
10 The signaling transfer point 1220 provides packet switching of message-based signaling protocols for use in the network and for a service control point 1230 ("SCP"), which provides access to a network database (not shown). The service control point 1230 communicates with a service management system 1240 ("SMS"), that provides a human interface to the database, as well as the capability to update the database when needed. An intelligent peripheral 1250 may also be added. The
15 intelligent peripheral 1250 may provide resource management of devices such as voice response units, voice announcers, and DTMF sensors for caller-activated services.

An additional feature of a modern PSTN is service-independent Advanced Intelligent Networks (AIN) capabilities. With AIN capabilities, service providers are
20 able to load service logic in a SCP. The service logic typically allows for triggering capabilities to be programmed in order to route the calls of the service's subscribers. Many different triggering conditions can be programmed including, for instance, an 'off hook' condition or a number of digits collected. Illustrative versions of the invention may operate with systems that route calls in this fashion.

25 In one illustrative version, the triggering condition could be an 'off hook' condition, e.g., a subscriber has taken his or her aural communication device off hook. In response to this triggering condition, calls from this subscriber's line could be

5 routed to a particular switch that performs functions analogous to those described above in connection with **Fig. 2** through **Fig. 7**. In this illustrative version, when a subscriber takes his or her phone off hook to place a call, the off-hook condition is detected and this triggers the routing of the call to the particular switch. The subscriber may then be transmitted informational message(s) under the control of the particular switch in a fashion analogous to that described above in connection with **Fig. 2** through **Fig. 7**. In another version, the service providers could trigger on a single digit key such as '*' or '#' to offer the service of similar functionality. In still others, another provider could trigger on multiple digits for the service.

10 Another illustrative embodiment would be where the central office switch is
programmed to route calls originating from subscribers to the device by appending a
routing code to the calls. The appended routing code triggers the routing of calls to
the device. One example of a suitable routing code are conventional Primary
15 Interexchange Carrier (“PIC”) codes, although one of skill in the art will appreciate
others.

In one version of this illustrative embodiment, the central office switch automatically appends the PIC code. Conventionally, central office switches use routing codes, such as PIC codes, to route long distance calls based on the subscriber's predetermined long-distance carrier. In this version, a subscription service could be established. The subscription service could offer, for instance, subsidized telecommunication products or services in exchange for the subscriber's receiving informational messages from a sponsor. A central office switch could be configured to append an appropriate PIC code associated with the service as the default routing code for subscribers in a fashion analogous to default routing codes for long-distance calls. Calls from subscribers to the service could then be routed to a particular switch which has been configured to implement the functions for and features of transmission of informational messages as described in this specification.

In another version, the routing code is entered by the user of the aural communication device. Conventionally, central office switches also use routing codes entered by the user, to route calls for particular long distance carriers. For instance, Telecom*USA of Arlington, Virginia, offers a service commercially available in the United States by which a user dialing "10 10 321", will have their call routed to Telecom*USA for long-distance calling. This conventional method of routing calls could be used to route calls to the particular switch which has been configured to implement the functions for and features of transmission of informational messages as described in this specification.

In still another version, the operator assistance code could be entered by the user of the aural communication device. This assistance code could be used by the central office switches conventionally to route calls from the caller to the particular switch which has been configured to implement the functions for and features of transmission of informational messages as described in this specification.

The aforementioned embodiments in which calls are routed to a particular switch provide a convenient architecture for commercial adoption of versions of the invention: the particular switch practicing features of the invention may be acquired by the operator of a central office switch (the particular switch may be collocated with existing central switching equipment or remotely disposed therefrom), existing routing methods may be used to then route subscriber's calls to the particular switch, and the particular switch may provide informational messages to subscribers. In the aforementioned embodiments, the functions described above in connection with **Fig. 2** through **Fig. 7** may be implemented. They may be implemented, for instance through software that configures the central office switch to implement the functions.

Alternatively, the particular switch may be an IVR system designed to perform functions analogous to those described above in connection with **Fig. 2** through **Fig. 7**. However, as one of skill in the art will appreciate, the call density is typically high in this type of embodiment. Accordingly, suitable interfaces should be used. Some

embodiments could use multiple T1/E1, others could use DS3; others could use still higher bandwidth interfaces.

In some variations of the aforementioned embodiments, an IVR system could be employed for verification of a subscriber. Again making reference to Fig. 1E, a first message switch 1270 and a second message switch 1280 will be noted. Referring to the first message switch 1270 as also illustrative of the second message switch 1280, it can be appreciated that the first message switch 1270 may be flexibly integrated with existing central switching hardware such as the first central office switch 1220 that could route calls to the first message switch 1270, i.e., the first message switch 1270 may be the particular switch described above. When a user of, for instance the third POTS phone 1710, initiates a call, the call could be routed by the first central office switch 1220 to the first phone/key IVR 1250 for user verification. The user may verify himself or herself by voice print matching in conjunction with the first phone/key IVR 1250, by entering personal identification information from a phone keypad, or through other means. If the voice print matches or the personal identification information validates, the system notifies the first message switch 1270 of the caller's identification and a voice channel on which the call is to be carried out. The first message switch 1270 could then consult the user's subscription profile to determine whether one or more informational messages should be sent transmitted to the user. As this illustrative example assumes the user is initiating a call, the informational messages would be AudioMT or AudioTM (with or without feedback options). The first message switch 1270 (configured for communication with the first message server 1110) can then transmit one or more informational messages retrieved from the first message server 1110 to the user. After the transmission of the informational message(s), the user's call proceeds (in the case of an AudioMT(s), an additional dial tone may be provided to the user after the transmission of the informational message(s)).

In still other embodiments an intelligent peripheral such as the intelligent peripheral **1250** may be used to implement features of the invention. Connection to a message server such as the first message server **1110** is made with a digital facility such as that typically found in a central office. Typically, a central office switch, such as the first central office switch **1220** has a connection to a digital facility. The digital facility allows signaling information between central office switches to be consolidated and sent through its own network apart from the voice network. This method is used in ISDN and SS7 today. In addition, this method of signaling is capable of sending and receiving messages, including, for instance, AudioTM,
5 AudioICM including information retrieved from a remote database.
10

As will be appreciated by one of skill in the art having the benefit of this disclosure, a connection to, for instance, the first message server **1110** may be obtained by having the first message server **1110** act as an intelligent peripheral such as the intelligent peripheral **1250**. The first message server **1110** would provide support for a protocol appropriate for communication with the central office switch (currently, SS7 could be used). The first message server **1110** may then either be directly connected to the central office switch through digital connection or through the service control point **1230**. Software running on a central office switch or a SCP may then be modified to implement functions according to the invention as described
15 herein.
20

For instance, when a central office switch detects that the subscriber's aural communication device is off-hook, the switch could be configured by programmed instructions to assemble the dialing digits and communicate them to the first message server **1110** and to communicate the subscriber's line information to the intelligent peripheral **1250**. If an AudioMT, an AudioTM, or an AudioICM should be sent to the subscriber, it will retrieve the message from the message server Intelligent Peripheral,
25 and then send it to the subscriber.

5

In addition, all or portions of a wireless communications network may also be integrated with the public switched telephone network 1200. When a wireless network is integrated with the public switched telephone network 1200, users of wireless mobile units may be transmitted informational messages as has been described above with reference to a phone directly connected to a central office switch. Other versions of the invention operate with other configurations of a wireless network as illustrated below.

5. WIRELESS

As noted, some embodiments of the invention operate with wireless networks. 10 Illustrative embodiments are described below in the context of a cellular wireless network with the understanding that one of skill in the art will comprehend principles of the invention in this description applicable in other types of wireless networks (also within the scope of the invention).

5.4 OUTGOING COMMUNICATION

15 Fig. 9 depicts a flow diagram of a method for communicating an AudioTM in accordance with an illustrative cellular embodiment. Process flow of a 'cellular AudioMT communication' method 9000 initiates at a 'start' terminal 9010 and continues to a 'call initiation' data block 9020. The 'call initiation' data block 9020 is received by the base transceiver stations 1903 and comprises an identification of the mobile unit 1905 and a serial number. A 'phone ID transmission' process 9030 20 passes this information to the mobile switching center 1920 and a 'calling phone authentication' process 9040 validates the calling phone number with the home local register 1930 and the visitor location register 1950 and authenticates the identity of the mobile unit 1905.

25 Process flow continues to a 'message server consultation' process 9050. The 'message server consultation' process 9050 is performed by the mobile switching

center 1920 and includes the mobile switching center 1920 transmitting mobile unit 1905 subscriber identification information to the message server 1990. The message server 1990 executes an ‘AudioTM to cellular’ decision process 9060 to determine whether AudioTM should be sent to the mobile unit 1905 at this time.

5 If the AudioTM should not be sent, the ‘AudioTM to cellular’ decision process 9060 exits through its ‘no’ branch and process flow continues to a ‘call placement’ process 9240 that initiates a conventional call connection sequence performed by the mobile switching center 1920.

10 If the AudioTM should be sent, the ‘AudioTM to cellular’ decision process 9060 exits through its ‘yes’ branch and process flow continues to an ‘an AudioTM retrieval’ process 9070 that retrieves the AudioTM from the message server 1990 for sending to the mobile unit 1905. Process flow continues to a ‘feedback AudioTM’ decision process 9080 that consults the AudioTM to determine whether the AudioTM will offer feedback options. If not, an ‘AudioTM transmission’ process 9090 15 transmits the AudioTM to the mobile unit 1905, a ‘messages sent flag setting’ process 9230 sets a flag indicating that the AudioTM was sent and process flow continues to the ‘call placement’ process 9240.

20 If the AudioTM, will offer feedback options, the ‘feedback AudioTM’ decision process 9080 exits through its ‘yes’ branch and process flow continues to an ‘feedback AudioTM transmission’ process 9100 that transmits the feedback AudioTM to the mobile unit 1905. The message may offer any of the feedback options previously discussed. An ‘AudioTM feedback indication’ decision process 9110 awaits an indication from the mobile unit 1905 of the selection of a feedback option. 25 If no indication of selection of a feedback option is received within a suitable predetermined time limit, e.g., 5 seconds, the ‘AudioTM feedback indication’ decision process 9110 exits through its ‘no’ branch and process flow continues to the ‘messages sent flag setting’ process 9230.

If an indication of the selection of a feedback option is received, the 'AudioTM feedback indication' decision process 9110 exits through its 'yes' branch and process flow continues to a 'feedback indication storage' process 9120 that posts the selected feedback option to the message server 1990. Next a 'call redirection' decision process 9130 determines if the particular selected feedback option involves redirecting the user of the mobile unit 1905 to complete a call to another entity before completion of the call from the 'call initiation' data block 9020. If so, the 'call redirection' decision process 9130 exits through its 'yes' branch and a 'number storage' process 9140 stores the number from the 'call initiation' data block 9020 while a 'redirected call' process 9150 executes. The 'redirected call' process 9150 involves the mobile switching center 1920 consulting the message server 1990 for the number to which a call should be placed given the particular feedback selection. In some embodiments, a user of the mobile unit 1905 may use an alias dialing feature as described above (in connection with the 'feedback AudioMT communication' process 4300) and below (in connection with Fig. 16) and the message server 1990 may map the dialed alias to the appropriate number to call. During the 'redirected call' process 9150 the user of the mobile unit 1905 may carry on a conventional phone conversation with the entity associated with the user's feedback option selection. From the 'redirected call' process 9150 process flow continues to a 'number retrieval' process 9160 in which the mobile switching center 1920 retrieves the originally-called number from the 'call initiation' data block 9020 that was stored by the 'number storage' process 9140.

If the particular selected feedback option does not involve redirecting the user of the mobile unit 1905 to complete a call to another entity, the 'call redirection' decision process 9130 exits through its 'no' branch and process flow continues to an 'automated output' decision process 9170 that determines if an automated output should be sent in response to the feedback selection. If so, the 'automated output' decision process 9170 exits through its 'yes' branch and process flow continues to an 'output generation' process 9180 that consults the message server 1990 for the

particular type of automated output that should be generated. Any of the types of automated output discussed above may be generated. Process flow continues to an 'output communication' process **9190** that communicates the automated output to a suitable receiving entity.

5 From the 'output communication' process **9190** or the 'number retrieval' process **9160** process flow continues to a 'remaining feedback' decision process **9200** that determines if the user has indicated an additional feedback option selection. The user may be presented with such an option by the 'output communication' process **9190** prompting them with an audio message of additional feedback options or the
10 AudioTM retrieved by the 'an AudioTM retrieval' process **9070** may indicate that any of a menu of feedback options could be selected at this point of the process flow. If the 'remaining feedback' decision process **9200** detects that an additional feedback option has been selected, it exits through its 'yes' branch and a 'next feedback message selection' process **9210** retrieves the appropriate next message. Process flow continues to a 'next feedback message communication' process **9220** that
15 communicates the next message to the mobile unit **1905** and process flow returns to the 'feedback indication storage' process **9120** for the next iteration.

If the 'remaining feedback' decision process **9200** does not detect that an additional feedback option has been selected, it exits through its 'no' branch and
20 process flow continues to the 'messages sent flag setting' process **9230** and the 'call placement' process **9240**. Processing completes through an 'end' terminal **9250**.

5.B INCOMING COMMUNICATION

Fig. 10 depicts a flow diagram of a method for communicating a TextICM message in accordance with an illustrative embodiment. The 'TextICM communication' method **10000** may operate with elements of a suitable cellular network topology including, for instance, the exemplary cellular network architecture **1900** discussed above in connection with Fig. 1D. Process flow initiates at a 'start'
25

terminal **10100** when a user is placing a call to the mobile unit **1905**. An 'incoming call' input block **10200** comprising the identification and serial number of the mobile unit **1905** as well as the called number is communicated to the mobile switching center **1920** that validates that called number with suitable lookup in the home local register **1930** and the visitor location register **1950**. Process flow continues to a 'TextICM' decision process **10300** that includes the mobile switching center **1920** providing a query to the message server **1990** to determine whether a TextICM should be communicated to the mobile unit **1905**. The query to the message server **1990** may include, for instance, identification information from the mobile unit **1905** such as the serial number, and the identification information may be used by the message server **1990** in conjunction with profile information to generate or select a TextICM responsive to the particular identification information. As one of skill in the art will appreciate, demographic, psychographic, and profile information may be used in generating or selecting the TextICM.

If the TextICM should not be sent the 'TextICM' decision process **10300** exits through its 'no' branch and process flow continues to an 'incoming call handling' process **10800** that completes the placement of the incoming call to the mobile unit **1905**. If the TextICM should be sent to the mobile unit **1905**, the 'TextICM' decision process **10300** exits through its 'yes' branch and process flow continues to a 'TextICM retrieval' process **10400** in which the TextICM is retrieved from the message server **1990**. Process flow continues to a 'text connection establishment' process **10500** in which the mobile switching center **1920** establishes a data communication connection to the mobile unit **1905**. Next, a 'TextICM transmission' process **10600** transmits the TextICM to the mobile unit **1905** where it may be perceived by the user thereof. A 'text connection termination' process **10700** terminates the text connection and process flow continues to the 'incoming call handling' process **10800** where the incoming call may be conventionally completed with the mobile unit **1905**. Process flow completes through an 'end' terminal **10900**.

User verification, as described above with reference to Fig. 1E, could also be employed with cellular embodiments. To employ speaker verification in a cellular embodiment, a speaker verification system, such as the PhoneKey system from ITT Industries and Buytel, can be installed between the mobile switching center 1920 and the public switched telephone network 1200. The process logic would then be similar 5 to that described above with reference to the third POTS phone 1710.

It will be understood by one of skill in the art having the benefit of this disclosure that the principles of the invention are not limited to messages of the type referred to above as a TextICM. Rather, this type of message has been used as the 10 basis of this description as it what the current generation of wireless communication devices in broad distribution can support. It is contemplated that as wireless communication device technology evolves it will support, for instance video and other media. It is contemplated that one of skill in the art having the benefit of this disclosure will be able to apply the principles of the invention to operate with such 15 devices, and such application is contemplated as within the scope and spirit of the present invention.

6. MULTIMEDIA MESSAGES

Some embodiments of the invention involve the transmission of non-audio or multimedia messages.

20 Suitable systems for such embodiments include, for example, a programmed general-purpose computer, or special-purpose computing machinery, that may be situated proximate to a conventional telephone. An office or home environment are typical situations where suitable systems may be found. The computer may be used to provide an enhanced message transmission system.

25 In an illustrative embodiment, a personal computer is situated near a phone, for example the first coupled PC & phone 1520. The phone and the computer are

connected with an IAD such as the first CPE device 1400. The computer is connected to the IAD via a LAN such as the first LAN 1540. The IAD has a hardware and software architecture as described in connection with Fig. 2 and Fig. 3 with additional logic for sending a signal (“SIGicm”) to the computer via the LAN when the IAD receives an indication that there is an incoming phone call for the phone line associated with the computer.

An IAD application runs on the computer that enhances the types of messages that may be transmitted in conjunction with use of the phone. In the illustrative embodiment, the IAD application provides conventional computer telephony functions including, for example, name based dialing, voice recognition dialing, multiple call forwarding and screening functions, etc., although the presence of these functions are not fundamental to the invention and may be omitted in alternative embodiments. The computer may also comprise a microphone and speakers that can operate as the mouthpiece and earpiece of a conventional telephone so that the computer may be used to send and receive telephone calls. The IAD application includes a driver to detect the SIGicm from the IAD. Further, the IAD application can generate pop-up-type windows or banners, and play multimedia, audio, or non-audio messages under the control of the IAD.

Upon installation of the IAD application, the IAD application sends a message to the IAD indicating that the computer is running the IAD application. The IAD then extracts a network address, such as an IP address, application software version, relevant host hardware and software configuration information, etc. from the computer. Then, the IAD sends informational messages in audio, non-audio, or multimedia form for storage on the computer.

Operation of the computer, phone, and IAD to provide informational messages in connection with outgoing communication will now be described. For this

discussion it is assumed that a first user of a first PC & phone is making an outgoing call.

Fig. 11 depicts a flow diagram of a method for communicating informational messages to a PC & phone in conjunction with an outgoing call 11000 in accordance with an illustrative embodiment. Process flow initiates at a 'start' terminal 11010 and receives an indication a first PC & phone is 'off hook' 11020. This may result from the first user picking up the handset of the phone or initiating a call though the computer. The 'off hook' condition is detected by an "off hook" detection process 11030 and process flow continues to an 'AudioMT to first user' decision process 11050 that determines if the first user should receive an AudioMT message. If so, the 'AudioMT to first user' decision process 11050 exits through its 'yes' branch and process flow continues to a 'AudioMT communication' process 11060 that communicates the AudioMT for perception by the first user. From the 'AudioMT communication' process 11060, or if the 'AudioMT to first user' decision process 11050 exits through its 'no' branch, process next flows to a 'message to computer display' decision process 11070 that determines whether a PopupM should be sent to the computer display.

If the PopupM should not be sent to the computer display, process flow continues to a 'dial tone to first user' process 11090. If the PopupM should be sent to the computer display, the 'message to computer display' decision process 11070 exits through its 'yes' branch and a 'send message to display' process 11080 sends a signal to the IAD application running on the computer to present the PopupM on the computer display. Process flow then continues to the 'dial tone to first user' process 11090 which provides a dial tone to the aural communication device of the first user and an outgoing call handling' process 11100 that accepts dialing digits from the first user's aural communication device and initiates the outgoing call.

Process flow continues to an ‘AudioTM to first user’ decision process 11130. The ‘AudioTM to first user’ decision process 11130 determines if an AudioTM should be sent to the first user. If the AudioTM should not be sent to the first user process flow continues to a ‘call establishment and handling’ process 11150 that completes establishing the first user’s call. If the AudioTM should be sent to the first user a ‘AudioTM communication’ process 11140 executes in a manner analogous to that described in connection with Fig. 6A and process flow continues through the ‘call establishment and handling’ process 11150 and completes through the ‘end’ terminal 11120.

Operation of the computer, phone, and IAD to provide informational messages in connection with incoming communication will now be described. For this discussion it is assumed that a second user of a second PC & phone is receiving an incoming call from a first user of a first aural communication device.

Fig. 12 depicts a method for communicating informational messages to a PC & phone in conjunction with an incoming call 12000. Process flow initiates at a ‘start’ terminal 12010 and continues to receive an ‘incoming call’ data block 12020 indicating that an incoming call has been received. Process flow continues to a ‘ring and ring back tone’ process 12030 that sends a ring signal to the second PC & phone and a ring back tone to the first aural communication device. Next, a ‘display message’ decision process 12040 determines if a PopupM should be sent to the computer display. If a message should be sent to the computer display, the ‘display message’ decision process 12040 exits through its ‘yes’ branch and an ‘message display’ process 12050 sends the PopupM to the IAD application running on the computer to initiate the display of the message. From the ‘message display’ process 12050, or if the ‘display message’ decision process 12040 exits through its ‘no’ branch, process flow continues to an ‘answered via PC’ decision process 12060.

The 'answered via PC' decision process **12060** determines if the incoming call has been answered with the computer. If so, process flow continues to a 'set 'Answered by PC' flag' process **12070** that sets a flag indicating the incoming call has been answered with the computer and process flow completes through an 'end' terminal **12080**.

5

If the incoming call was not answered with the computer, process flow continues to an 'answered by handset' decision process **12090**. The 'answered by handset' decision process **12090** determines if the incoming call has been answered with the phone handset. If the incoming call was not answered with the phone handset, process flow continues to a 'ring limit' decision process **12100**. The 'ring limit' decision process **12100** determines if a limit on the number of rings has been exceeded. If the ring limit has been exceeded, process flow continues to an 'set 'No Answer' flag' process **12110** that sets a flag indicating that the incoming call was not answered and process flow completes through the 'end' terminal **12080**.

10

If the incoming call was answered with the phone handset, the 'answered by handset' decision process **12090** exits through its 'yes' branch to enter an 'AudioICM to second user' decision process **12120**. If an AudioICM is not to be transmitted, the 'AudioICM to second user' decision process **12120** exits through its 'no' branch and process flow completes through the 'end' terminal **12080**.

15

If an AudioICM is to be transmitted, the 'AudioICM to second user' decision process **12120** exits through its 'yes' branch and a 'retrieve AudioICM' process **12130** retrieves the AudioICM from the memory subsystem **2200**. Next, if the AudioICM is compressed, a 'compressed message' decision process **12140** exits through its 'yes' branch and a 'decompression' process **12150** decompresses the AudioICM. Process flow continues to a 'text to audio' decision process **12160** that exits through its 'yes' branch if the AudioICM is in text form and should be converted to audio. A 'text to audio conversion' process **12170** performs the conversion. Process flow continues to

a ‘send AudioICM to second user‘ process **12180** that transmits the AudioICM in audio form to the second phone for perception by the second user.

Process flow continues to a ‘remaining messages‘ decision process **12190**. If no messages remain for transmission, the ‘remaining messages‘ decision process **12190** exits through its ‘no’ branch and a ‘set ‘Message Sent’ flag‘ process **12210** sets a flag indicating that the AudioICM was sent and process flow completes through the ‘end‘ terminal **12080**. If there is a remaining message for transmission, the ‘remaining messages‘ decision process **12190** exits through its ‘yes’ branch and process flow continues to a ‘continue ring back tone‘ process **12200**. As was described above in connection with the ‘continue Ring Back Tone‘ process **7160** of Fig. 7, the ‘continue ring back tone‘ process **12200** of Fig. 12 may provide the Ring Back Tone to the originator of the incoming communication. In other versions, the ‘continue ring back tone‘ process **12200** sends a call connected message to the switching system to indicate that the incoming communication has been accepted and thereafter a message may be sent to the first user indicating the first user that his or her call is connecting with the second user. In other versions the message indicating that his or her call is connecting with the second user may be sent before the call connected message is sent to the switching system. In either case, the message indicating that his or her call is connecting with the second user may be substituted by, or accompanied with, an informational message such as has been described above. Process flow returns to the ‘retrieve AudioICM‘ process **12130** to retrieve the remaining message and begin the next iteration.

6.A. VOICE OVER IP CLIENT RUNNING ON A PC CONNECTED TO AN IAD

In some embodiments of the invention where the computer is running the IAD application, the computer is also running an application that allows the computer to act as a VoIP client.

Fig. 13A depicts a flow diagram for a method for communicating a PopupM message to a VoIP client in conjunction with an outgoing call in accordance with an illustrative embodiment. Process flow initiates at an 'start' terminal 13010 and continues to a 'VoIP call initiated' data block 13020 that is detected by the IAD and indicates that a VoIP call has been initiated by the VoIP client running on the computer. Process flow continues to a 'send PopupM' decision process 13030 that determines whether a PopupM should be sent. If the PopupM should be sent, process flow continues to a 'signal PC' process 13040 where the IAD communicates a signal to the IAD application running on the computer to display the PopupM.

From the 'signal PC' process 13040, or if the 'send PopupM' decision process 13030 exits through its 'no' branch, process flow continues to a 'continue VoIP call' process 13050 that continues the VoIP conventionally. Process flow completes through an 'end' terminal 13060.

Fig. 13B depicts a flow diagram for a method for communicating a PopupM message to a VoIP client in conjunction with an incoming call in accordance with an illustrative embodiment. Process flow initiates at a 'start' terminal 13070 and continues to a 'VoIP call received' data block 13080 that is detected by the IAD and indicates that an incoming VoIP call has been received. Process flow continues to a 'send PopupM' decision process 13090 that determines whether a PopupM should be sent. If the PopupM should be sent, process flow continues to a 'signal PC' process 13100 where the IAD communicates a signal to the IAD application running on the computer to display the PopupM.

From the 'signal PC' process 13100, or if the 'send PopupM' decision process 13090 exits through its 'no' branch process flow continues to an 'incoming call indication' process 13110 where the IAD passes a Call Setup message to the VoIP client running on the computer. Process flow continues to a 'continue VoIP call' process 13120 that continues the VoIP conventionally. Process flow completes through an 'end' terminal 13130.

6.B. FEEDBACK MULTIMEDIA MESSAGES

Some embodiments provide feedback multimedia messages. In Fig. 14 and Fig. 15 described below, to illustrate structures performing functions in accordance with an illustrative version of the invention, headings are provided in the figures indicating the structures performing the processes below. While described below in the context of an "HTTP Server" and "IAD/PBX" it will be understood that these structures are illustrative and not limiting. Further a "Computer/Phone" as used below refers to a device, such as an integrated computer and telephone, capable of performing ordinary telephonic communications and the function of a general purpose programmable computer.

Fig. 14 depicts a flow diagram for a method for communicating a feedback PopupM message to a computer/phone in conjunction with an outgoing communication in accordance with an illustrative embodiment. An 'outgoing feedback PopupM' method 14000 initiates at a 'start' terminal 14010 and process flow continues to receive an 'off hook' input block 14020 indicating that the computer/phone has detected that a user desires to make a call. The 'off hook' input block 14020 is passed to the IAD/PBX and received by a 'detects off hook' process 14030.

Process flow continues in the IAD/PBX to a 'send PopupM' decision process 14040 that determines whether a PopupM should be sent to the computer/phone. The 'send PopupM' decision process 14040 may consult a profile in local or remote data store as has been previously illustrated.

If the PopupM should be sent, the 'send PopupM' decision process 14040 exits through its 'yes' branch and process flow continues to a 'PopupM communication' process 14050 where the IAD/PBX retrieves the PopupM and

transmits it to the computer/phone where a 'PopupM display' process **14060** presents it to the user.

Some embodiments allow feedback to take place with a browser application running on the computer/phone. Others allow feedback to take place with a call being placed to a third party. The ‘PopupM display’ process 14060 may prompt the user for either of the previously-identified types of feedback. For instance, the PopupM could provide a banner that comprises hyperlinks that, when selected by the user, are followed by a browser application. The hyperlinks may be to a sponsor’s web site or, more generally, to any network resource addressable in the internet-type network 1100. Alternatively the PopupM could have a sound file prompt the user to make such a selection. Still further, the PopupM may use a banner or sound file to prompt the user to select an item that will result in a call being placed to a third party, for instance, a sponsor, other merchant, etc. Both the Uniform Resource Identifier in the hyperlink and the phone number of the third party to be called are examples of resource identifiers. More generally, other embodiments of the invention may use other resource identifiers.

From the ‘PopupM display’ process 14060 process flow continues to a ‘resource identifier selection typing’ process 14070 that determines a type of resource selected by the user. If the user does not select a feedback option within a predetermined time, process flow continues to an ‘outgoing call handling’ process 14120 in which the IAD/PBX accepts a dialing sequence and establishes the user’s outgoing call.

If the resource identifier selected by the user is a phone number of a third party to be called, the ‘resource identifier selection typing’ process 14070 passes this information to the IAD/PBX and a ‘RI call handling’ process 14140 executes in which the user completes the call to the third party. Process flow then continues to the ‘outgoing call handling’ process 14120.

If the resource identifier selected by the user is Uniform Resource Identifier, the 'resource identifier selection typing' process 14070 passes this information to a browser application running on the computer/phone which sends a request message for the identified resource. A 'uniform resource identifier request' input block 14090 is received by the server from which the identified resource is available and process flow continues to a 'response generation' process 14100 where the server generates the response to be sent. The response may be one or more HTML pages, or other World Wide Web resource. Process flow continues to a 'browsing' process 14110 in which the user may browse World Wide Web resources while they complete their call. Process flow continues to the 'outgoing call handling' process 14120 where the IAD/PBX receives the number the user desires to call and establishes the connection. Process flow continues to an 'outgoing call' process 14130 in which the user carries on his or her outgoing call. The 'outgoing call' process 14130 is shown within the 'browsing' process 14110 to indicate that user may operate the browser application during the 'outgoing call' process 14130. When the 'outgoing call' process 14130 completes process flow completes through an 'end' terminal 14150.

Fig. 15 depicts a flow diagram for a method for communicating a feedback PopupM message to a computer/phone in conjunction with an incoming communication in accordance with an illustrative embodiment. An 'incoming feedback PopupM' method 15000 initiates at a 'start' terminal 15010 and process flow continues to receive an 'incoming call' input block 15020 whereupon a 'detects incoming call' process 15030 executes. The 'incoming call' input block 15020 is passed to the computer/phone and an 'incoming call indication' process 15040 provides a indication that there is an incoming call, e.g. a conventional ring or simulated ring.

Process flow continues back to the IAD/PBX where a 'send PopupM' decision process 15050 determines whether a PopupM should be sent to the computer/phone.

The ‘send PopupM’ decision process **15050** may consult a profile in local or remote data store as has been previously illustrated.

If the PopupM should be sent, the ‘send PopupM’ decision process **15050** exits through its ‘yes’ branch and process flow continues to a ‘PopupM communication’ process **15060** where the IAD/PBX retrieves the PopupM and transmits it to the computer/phone where a ‘PopupM display’ process **15070** presents it to the user.

In contrast to the ‘outgoing feedback PopupM’ method **14000** when a call is incoming, preferred embodiments of the invention do not provide the user with the option of placing a call to a third party, although this feature could be implemented by one of skill having the benefit of this disclosure. The call to the third party could be placed after completion of the incoming call.

From the ‘PopupM display’ process **15070** process flow continues to a ‘resource identifier selection typing’ process **15080** that determines a type of resource selected by the user. If the user does not select a feedback option within a predetermined time, process flow continues to an ‘incoming call handling’ process **15120** in which the IAD/PBX establishes the connection for the user’s incoming call.

If the resource identifier selected by the user is a Uniform Resource Identifier, the ‘resource identifier selection typing’ process **15080** passes this information to a browser application running on the computer/phone which sends a request message for the identified resource. A ‘uniform resource identifier request’ input block **15090** is received by the server from which the identified resource is available and process flow continues to a ‘response generation’ process **15100** where the server generates the response to be sent. The response may be one or more HTML pages, or other World Wide Web resource. Process flow continues to a ‘browsing’ process **15110** in which the user may browse World Wide Web resources while the incoming call is completed. Process flow completes through an ‘end’ terminal **15140**.

7. ALIAS DIALING

The alias feature will now be described in more detail. Fig. 16 depicts a flow diagram an ‘alias dialing’ method 16000 in accordance with an illustrative embodiment. Process flow initiates at a ‘start’ terminal 16010 and continues to an ‘off hook detection’ data block 16020 that contains a signal that a user’s aural communication device is “off hook.” When the user enters a dialing sequence a ‘dialing sequence’ input block 16030 is received and is passed to the call management module 3110. Next a ‘recognized alias’ decision process 16040 determines whether the dialing sequence corresponds to a recognized alias. In some embodiments, an alias may be recognized by having a “star” before and after the digits, e.g., “*489*”, in other embodiments an alias may be recognized by a “star” before the digits coupled with a delay of suitable length, e.g. 5 seconds after entry of the last digit. If an alias is not recognized, the ‘recognized alias’ decision process 16040 exits through its ‘no’ branch and process flow completes though an ‘end’ terminal 16070. If the call management module 3110 recognizes an alias, the ‘recognized alias’ decision process 16040 exits through its ‘yes’ branch and process flow continues to a ‘target retrieval’ process 16050. In the ‘target retrieval’ process 16050, the call management module 3110 sends the dialing sequence from the ‘dialing sequence’ input block 16030 to an alias server, which may be, for example, a message server such as the first message server 1110 or the second message server 1120. The alias server will translate the alias name into a corresponding phone number, generates, and communicates a response message comprising the phone number. When the alias server is also a message server, an informational message may also be returned. The call management module 3110 receives the response message via the message server agent 3030. Process flow continues to a ‘target calling’ process 16060 where the call management module 3110 places the call to the phone number received in the response. When an informational message is also received, the ‘target calling’ process 16060 may also transmit the informational message. In some embodiments the informational message may indicate the party being called, e.g. ‘Now dialing ITX

Networks,” and the user will be connected to the target of the alias. The user may then used their aural communication device conventionally with the target of the alias. Process flow completes through the ‘end’ terminal 16070.

5 All patents, patent applications, documents, standards, protocols, and draft protocols referred to herein are incorporated herein by this reference in their entirety.

Although the present invention has been described in terms of illustrative embodiments, one skilled in the art will understand that various modifications and alterations may be made without departing from the scope of the invention. Accordingly, the scope of the invention is not to be limited to the particular 10 embodiments discussed herein, but should be defined only by the appended claims and equivalents thereof.

Claims

What is claimed is:

1. A method for providing at least one informational message to an aural communication device user in connection with an outgoing communication, said
5 method comprising:

retrieving a first informational message from a message server;

storing said first informational message in a memory;

detecting a first aural communication device is in use;

retrieving said first informational message from said memory;

10 transmitting said first informational message to said first aural communication device for perception by said user; and

providing an indication to said first aural communication device that said first aural communication device is available for connection to a second aural communication device.

15 2. A method according to claim 1 wherein said transmitting step initiates before said providing step.

3. A method according to claim 1 wherein said providing step initiates before said transmitting step.

20 4. A method according to claim 1 wherein said informational message prompts a user of said first aural communication device to respond with said first aural communication device and further comprising:

receiving a response from the user with said first aural communication device.

5. A method according to claim 4 wherein said informational message comprises a location.

5 6. A method according to claim 5 further comprising:

establishing a communication path between said first aural communication device and said location upon receiving said response from the user of said first aural communication device.

10 7. A method according to claim 6 wherein at least a portion of said communication path is established over a local area network..

8. A method according to claim 6 wherein said location is a phone number and said communication path is established to a second aural communication device.

9. A method according to claim 5 wherein said location is uniform resource identifier.

15 10. A method according to claim 4 wherein said response is an alias.

11. A method according to claim 10 further comprising:

querying a database to map said alias to a location; and

establishing a communication path between said first aural communication device and said location upon receiving said response from the user said first aural communication device.

20 12. A method according to claim 1 wherein said first aural communication device comprises a telephone.

13. A method according to claim 1 wherein said first aural communication device comprises an etherphone.

14. A method according to claim 1 wherein said first aural communication device comprises a computer, a microphone, a speaker, and a computer telephony application.

5

15. A method according to claim 1 wherein computer telephony application comprises a packetized voice communications application.

16. A method according to claim 1 wherein said packetized voice communications application is a VoIP application.

10

17. A method according to claim 1 wherein said first aural communication device comprises wireless communication unit.

18. A method according to claim 1 wherein said wireless communication unit comprises a cellular communications unit.

15

19. A method according to claim 1 wherein said informational message provides the user of said aural communication device with a selectable option.

20. A method according to claim 19 further comprising:

receiving an indication of the selection of said selectable option, and communicating said indication of the selection of said selectable feedback option to message sever, wherein thereafter an automated response is generated.

20

21. A method according to claim 20 wherein said automated response is an electronic mail message.

22. A method according to claim 20 wherein said automated response is a coupon.

23. A method according to claim 20 wherein said automated response is communicated to a merchant.

24. A method according to claim 1 wherein said informational message is selected responsive to a profile associated with said user.

5 25. A method according to claim 1 wherein said informational message is selected responsive to a profile associated with a sponsor.

26. A method according to claim 1 wherein said step of detecting a first aural communication device is in use is performed by a first switching system, and further comprising:

10 receiving routing information;

routing communications from said first aural communication device to a second switching system responsive to said routing information; and wherein the additional steps of claim 1 are performed by said second switching system.

15 27. A method according to claim 26 wherein said routing information comprises:

a routing code.

28. A method according to claim 27 wherein said routing code comprises:

a primary interexchange carrier (PIC) code.

29. A method according to claim 27 wherein said routing code comprises:

20 a predetermined number of dialing digits detected by a service control point as a subscriber-based routing trigger.

30. A method according to claim 26 wherein said routing information comprises:

an off-hook condition detected by a service control point as a subscriber-based routing trigger.

5 31. A method according to claim 3 further comprising:

determining if said second aural communication device has answered; and
if said second aural communication device has answered,
indicating the establishment of the connection; and

10 transmitting a second informational message to said
first aural communication device for perception by said user.

32. A method according to claim 31 wherein said second informational message is acoustically mixed with a ring back signal.

15 33. A method according to claim 3 wherein if said second aural communication device has not answered, performing at least one time steps of:
retrieving a second informational message and transmitting said second informational message to said first aural communication device for perception by said user

34. A method according to claim 31 wherein said second informational message is selected responsive to a profile of a sponsor.

20 35. A method according to claim 1 wherein said first informational message is compressed and the step of transmitting said first informational message to said first aural communication device for perception by said user comprises:

decompressing said first informational message; and

transmitting said decompressed first informational message.

36. A method according to claim 1 wherein said first informational message is in text form and the step of transmitting said first informational message to said first aural communication device for perception by said user comprises:

converting said text form to an audio form; and

5 transmitting said audio form of said first informational message.

37. A method according to claim 1 further comprising:

authenticating the identity of said user.

38. A method according to claim 37 wherein authenticating the identity of said user comprises receiving personal identification information from said user.

10 39. A method according to claim 38 wherein said personal identification information comprises a voice print.

40. A method for providing at least one informational message to an aural communication device user in connection with an incoming communication, said method comprising:

15 receiving an indication of an incoming communication from a first aural communication device to a second aural communication device;

detecting said second aural communication device has answered said incoming communication;

retrieving a first informational message; and

20 transmitting said first informational message to said second aural communication device for perception by the user of said second aural communication device, wherein said transmitting step follows said detecting step.

41. A method according to claim 40 wherein said informational message is selected responsive to a profile associated with said user.

42. A method according to claim 40 wherein said informational message is selected responsive to a profile associated with a sponsor.

5 43. A method according to claim 40 further comprising:

providing a ringback signal to said first aural communication device;

establishing a communication path to said first aural communication device; and performing steps comprising:

retrieving a second informational message; and

10 transmitting said second informational message to said first aural communication device for perception by the user of said first aural communication device,

at least one time.

44. A method according to claim 40 wherein said first informational message is compressed and the step of retrieving a first informational message further comprises:

decompressing said first informational message; and

transmitting said decompressed first informational message.

45. A method according to claim 40 wherein said first informational message is in text form and the step of retrieving a first informational message further comprises converting said text form to an audio form and transmitting said audio form of said first informational message.

46. An apparatus configured for connection to at least one aural communication device and a data network, said apparatus for providing at least one informational message to a user of an aural communication device, said apparatus comprising:

- 5 a processor;
- a memory communicatively coupled with said processor;
- a network interface communicatively coupled with said processor, said network interface configured for communication over said data network;
- a subscriber line interface communicatively coupled with said processor;

10 and

 a message agent, said message agent adapted to retrieve at least one informational message for storage in said memory, wherein said at least one message may be communicated to said subscriber line interface under the control of said processor.

15 47. An apparatus according to claim 46 wherein said subscriber line interface communicatively coupled with said processor comprises:

 a line interface circuit, said line interface circuit configured to detect if said aural communication device connected to said apparatus is in use, said line interface circuit further configured to provide an incoming communication signal to said aural communication device, said line interface circuit further configured to transmit and receive telecommunications signals to said aural communication device;

20 and

 a line audio processor, said line audio processor configured to convert audio signals to digital samples for communication to said line interface circuit.

48. A method for transmitting at least one informational message to a packetized voice client for perception by a user of said packetized voice client comprising:

5 receiving an indication of an outgoing packetized voice communication from a sender client to a recipient client;

sending an indication to said sender that said outgoing packetized voice communication was accepted by said recipient client;

transmitting an informational message to said sender for perception by a user of said sender client; and

10 thereafter forwarding an indication of an outgoing packetized voice communication to said recipient client, wherein said recipient client may accept said outgoing communication.

49 A method according to claim 48 wherein said informational message prompts said user of said sender client to respond with said sender client and future 15 comprising:

receiving a response from the user with said sender client.

50. A method according to claim 49 wherein said informational message provides the user of said aural communication device with a selectable feedback option.

20 51. A method according to claim 50 further comprising:

receiving an indication of the selection of said selectable feedback option, and

communicating said indication of the selection of said selectable feedback option to a message sever, wherein thereafter an automated response is generated.

52. A method for transmitting at least one informational message to a packetized voice client for perception by a user of said packetized voice client comprising:

5 receiving an indication of an acceptance of a packetized voice communication from a recipient client, said acceptance communicated responsive to a request to initiate a packetized voice communication from a sender client;

transmitting an informational message to said recipient client for perception by a user of said recipient client; and thereafter;

forwarding said acceptance to said sender client.

10 53. A method according to claim 52 wherein said informational message is selected responsive to a profile associated with said user.

54. A method according to claim 52 wherein said informational message is selected responsive to a profile associated with a sponsor.

15 55. A system for providing interactive informational messages to user of aural communication device comprising:

a telephone switching system, said telephone switching system further comprising a message agent, a network interface, and a subscriber line interface, said network interface configured for communicative coupling with a telecommunications network; and

20 a networked computer system, said computer comprising a programmable computer, a display, a microphone, a speaker, and a telecommunications interface, said telecommunications interface communicatively coupled with said subscriber line interface of said telephone switching system, said computer system configurable to provide an aural communication device by receiving aural communications with said microphone and audibly reproducing aural communications with said speaker,

25

instructions configuring said programmable computer to provide a client application, instructions further configuring said computer to display an informational message responsive to signals from said telephone switching system.

5 56. A system according to claim 55 wherein said informational message comprises a selectable action.

57. A system according to claim 56 wherein selection of said selectable action comprises sending a request for a resource available on the data network.

58. A system according to claim 56 wherein selection of said selectable action comprises initiating a telephonic communication.

10 59. A method for providing an informational message in conjunction with a computer-telephony system, said computer-telephony system comprising a computer, a speaker, and a microphone, said speaker and microphone operatively coupled with said computer, programmed instructions configuring said computer-telephony system to provide a first aural communication device, said method comprising:

15 transmitting at least one informational message to said computer telephony system;

detecting said first aural communication device is in use; and

20 providing a signal to said computer system to present one of said at least one informational message, wherein thereafter said one of said at least one informational message is displayed for perception by a user of said first aural communication device.

60. A method according to claim 59 wherein said informational message is selected responsive to a profile associated with said user.

61. A method according to claim 59 wherein said informational message is selected responsive to a profile associated with a sponsor.

62. A method according to claim 59 wherein said informational message comprises a selectable resource identifier, said selectable resource identifier associated with a communication resource.

5 63. A method according to claim 62 further comprising:

receiving an indication of the selection of said resource identifier;

10 establishing a communication path between said first aural communication device and said communication resource associated with said selected resource identifier.

64. A method according to claim 63 wherein said selectable resource identifier is a uniform resource identifier and said communication resource is a world wide web server.

15 65. A method according to claim 63 wherein said selectable resource identifier is phone number and said communication resource is a second aural communication device.

20 66. A method according to claim 59 wherein said informational message comprises a first selectable resource identifier associated with a first communication resource and a second selectable resource identifier associated with a second communication resource, said method further comprising:

receiving an indication of the selection of said first resource identifier;

establishing a communication path between said first aural communication device and said first communication resource associated with said first selected resource identifier.

receiving an indication of the selection of said second resource identifier;
establishing a communication path between said first aural communication device and said second communication resource associated with said second selected resource identifier.

5 67. A system for providing informational messages to a user of aural communication device comprising:

a switching system, said switching system routing voice telecommunications between at least a first aural communication device and a second aural communication device, said switching system further configured for
10 communicative coupling with a data network;

a message server, said message server configured for client-server communications with said switching system via said data network, said message server storing an informational message;

15 a message manager, said message manager configuring said switching system to request said informational message from said message server; and

a call manager, said call manager configuring said switching system to perform steps comprising:

20 receiving said informational message from said message manager; and
transmitting said informational message to said first aural communication device.

68. A system according to claim 67 wherein said switching system is further configured receive calls routed from a central switch, said central switch configured to route calls to said system responsive to routing information comprising:

a routing code.

69. A system according to claim 68 wherein said routing code comprises:

a a primary interexchange carrier (PIC) code.

70. A system according to claim 68 wherein said routing code comprises:

5 a predetermined number of dialing digits detected by a service control point as a subscriber-based routing trigger.

71. A system according to claim 67 wherein said routing information comprises:

an off-hook condition detected by a service control point as a subscriber-based routing trigger.

10 72. A system according to claim 67 wherein said call manager further configures said switching system to perform steps comprising:

receiving dialing information from said first aural communication device, said dialing information for establishing a communications path to said second aural communication device;

15 receiving an off hook indication from said second aural communication device;

transmitting a second informational message to said second aural communication device; and

20 establishing a communication path between said first aural communication device and said second aural communication device.

73. A system according to claim 67 further comprising an interactive voice response ("IVR") system for speaker verification, said IVR system configured for communication with said central switching system.

74. A system according to claim 67 wherein said call manager performs steps further comprising:

detecting said first aural communication device is in use; and

providing a dial tone to said first aural communication device subsequent to transmitting said informational message.

5 75. A system according to claim 67 wherein said call manager performs steps further comprising:

detecting said first aural communication device is in use; and

providing a dial tone to said first aural communication device prior to 10 transmitting said informational message.

76. A system according to claim 67 wherein said call manager performs steps further comprising:.

receiving an off hook signal from said first aural communication device;

15 receiving dialing information from said first aural communication device, said dialing information for establishing a communications path to said second aural communication device;

receiving an off hook signal from said second aural communication device; and

20 providing a dial tone to said first aural communication device prior to transmitting said informational message.

77. In a wireless communications network, a method for providing an informational message in conjunction with an incoming communication for an aural

communication device user, said aural communication device having an associated identifier, said method comprising:

receiving an indication of said incoming communication for said aural communication device;

5 retrieving an informational message from a message server;

establishing a data communication connection to said aural communication device;

transmitting said informational message to said aural communication device via said data communication connection; and

10 thereafter establishing a voice connection to said aural communication device for said incoming communication.

78. A method according to claim 77 wherein said informational message comprises image data.

15 79. A method according to claim 77 wherein said informational message comprises textual data.

80. A method according to claim 77 wherein authenticating the identity of said user comprises receiving personal identification information from said user.

81. A method according to claim 80 wherein said personal identification information comprises a voice print.

20 82. A method according to claim 77 wherein retrieving an informational message from a message server comprises:

providing said identifier of said aural communication device to a message server;

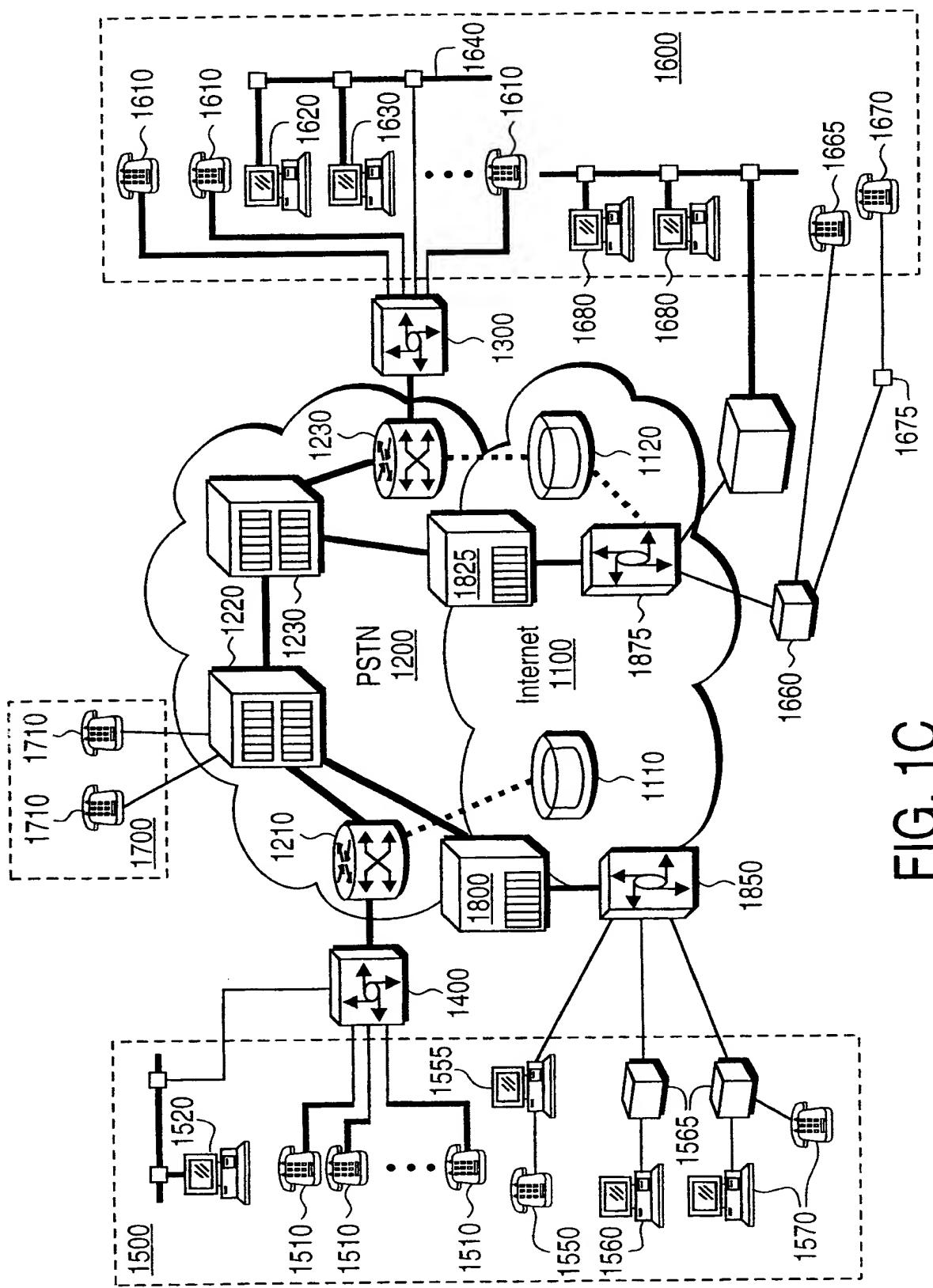


FIG. 1C

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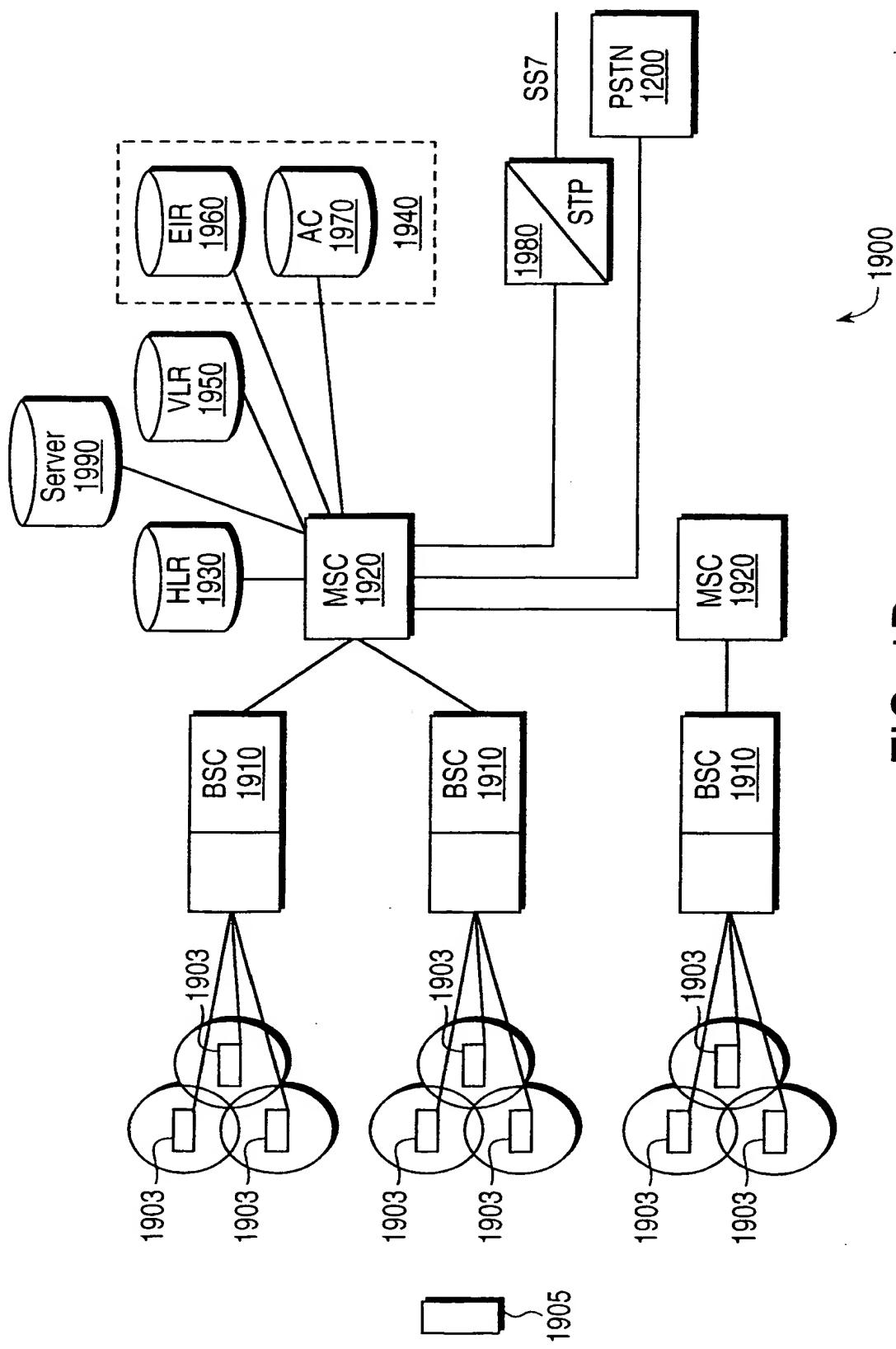


FIG. 1D

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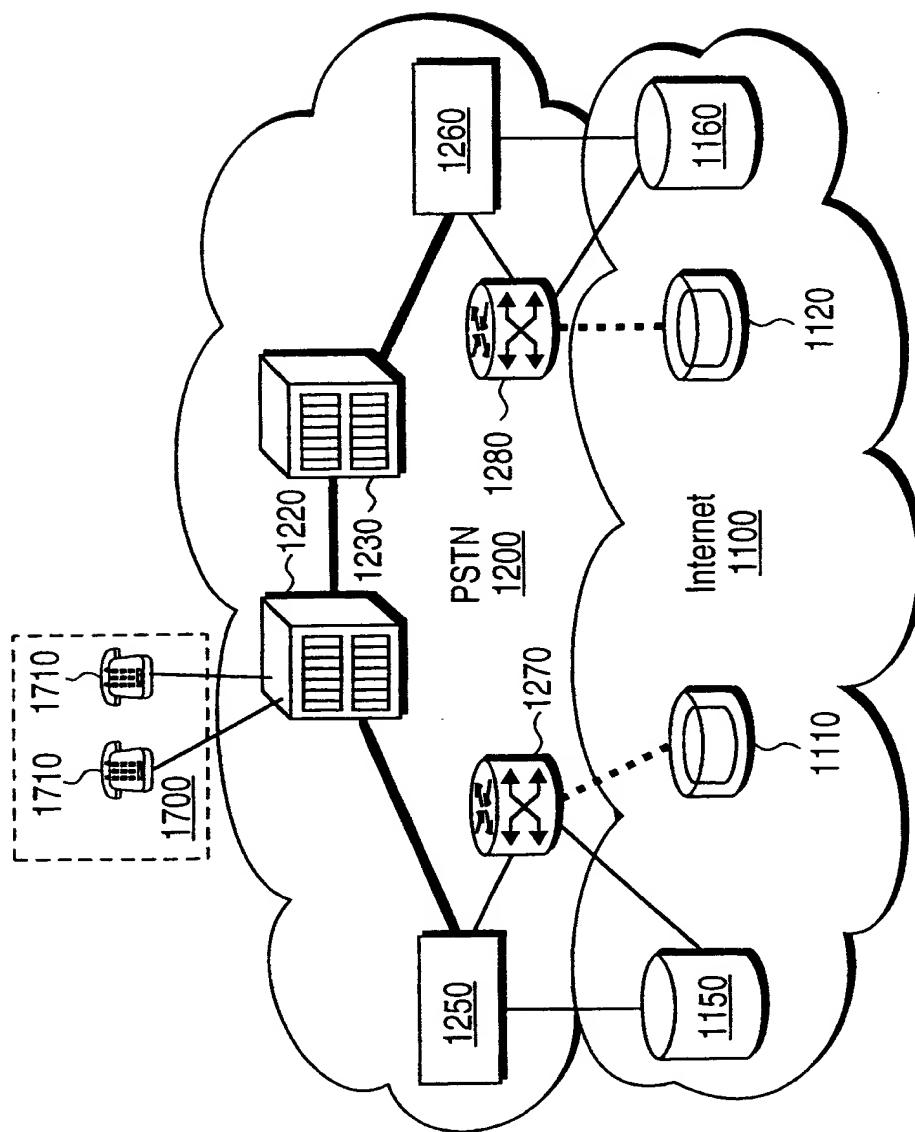


FIG. 1E

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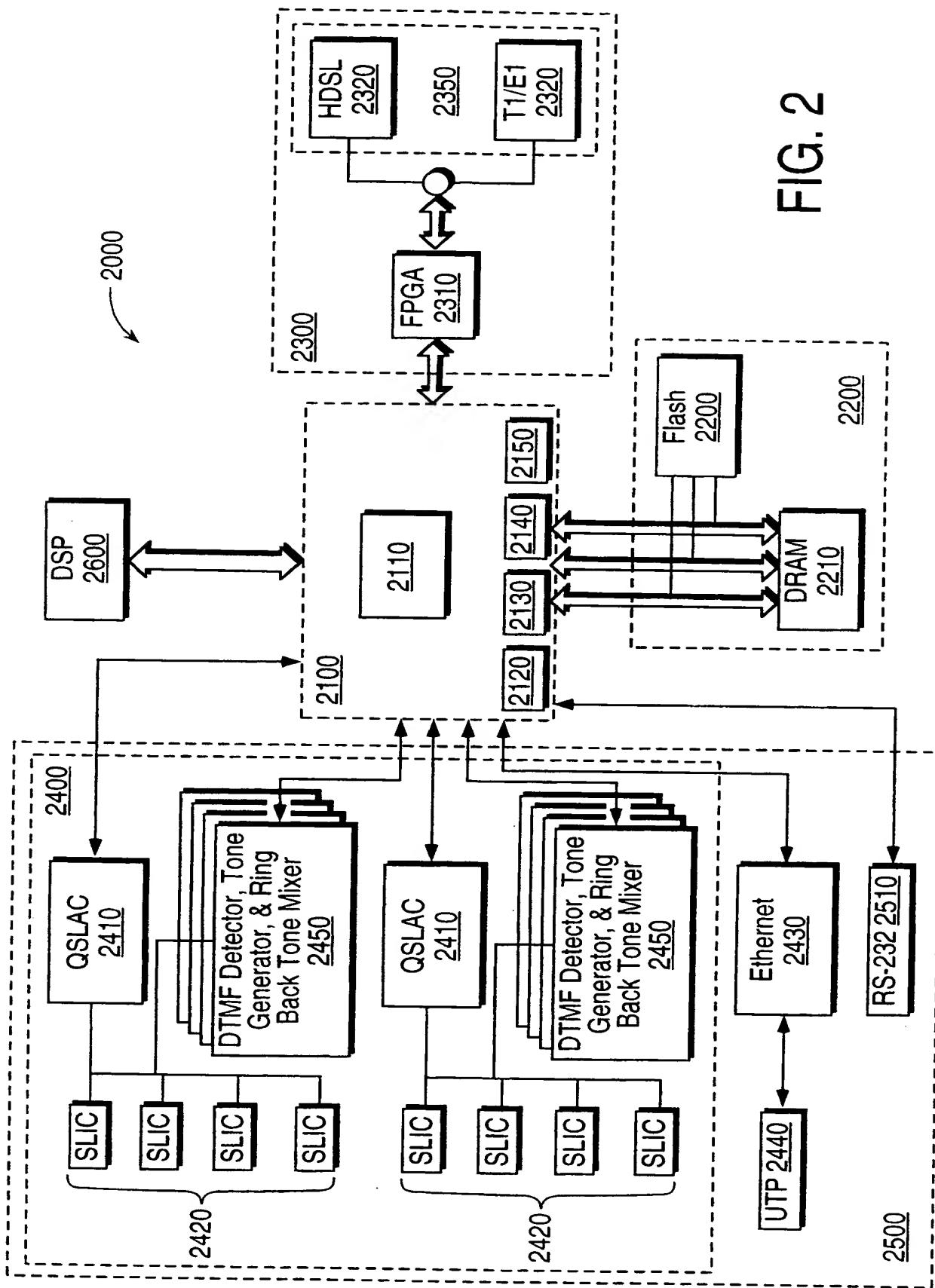
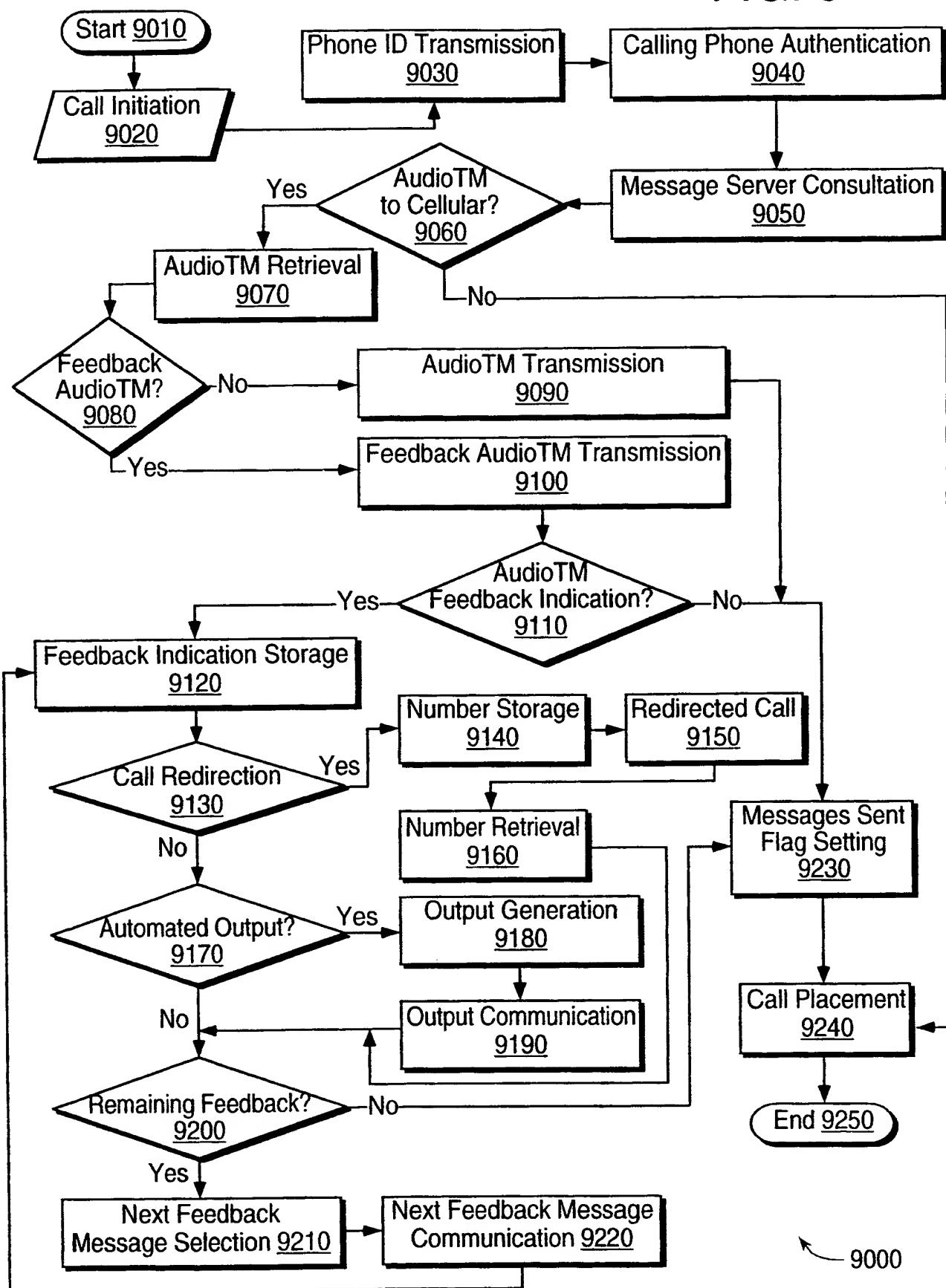


FIG. 2

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FIG. 9



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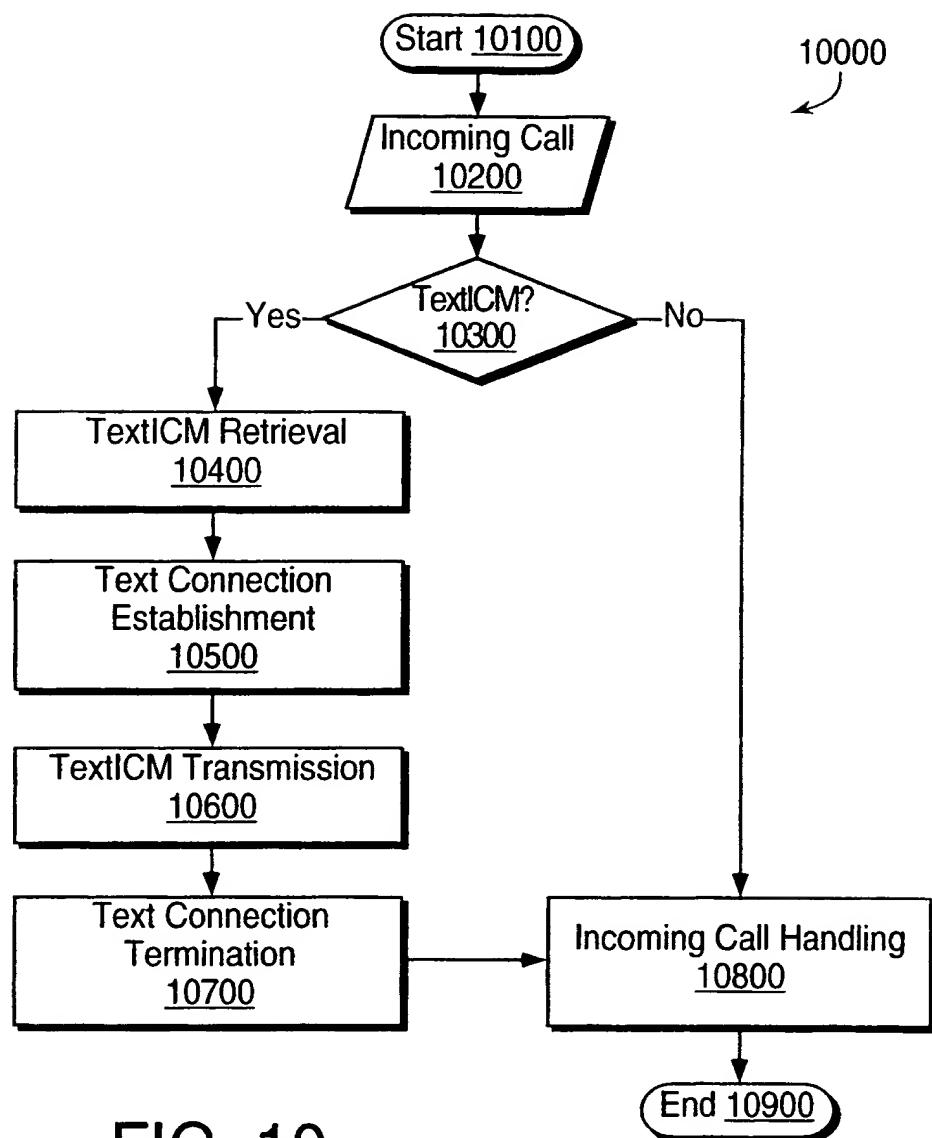
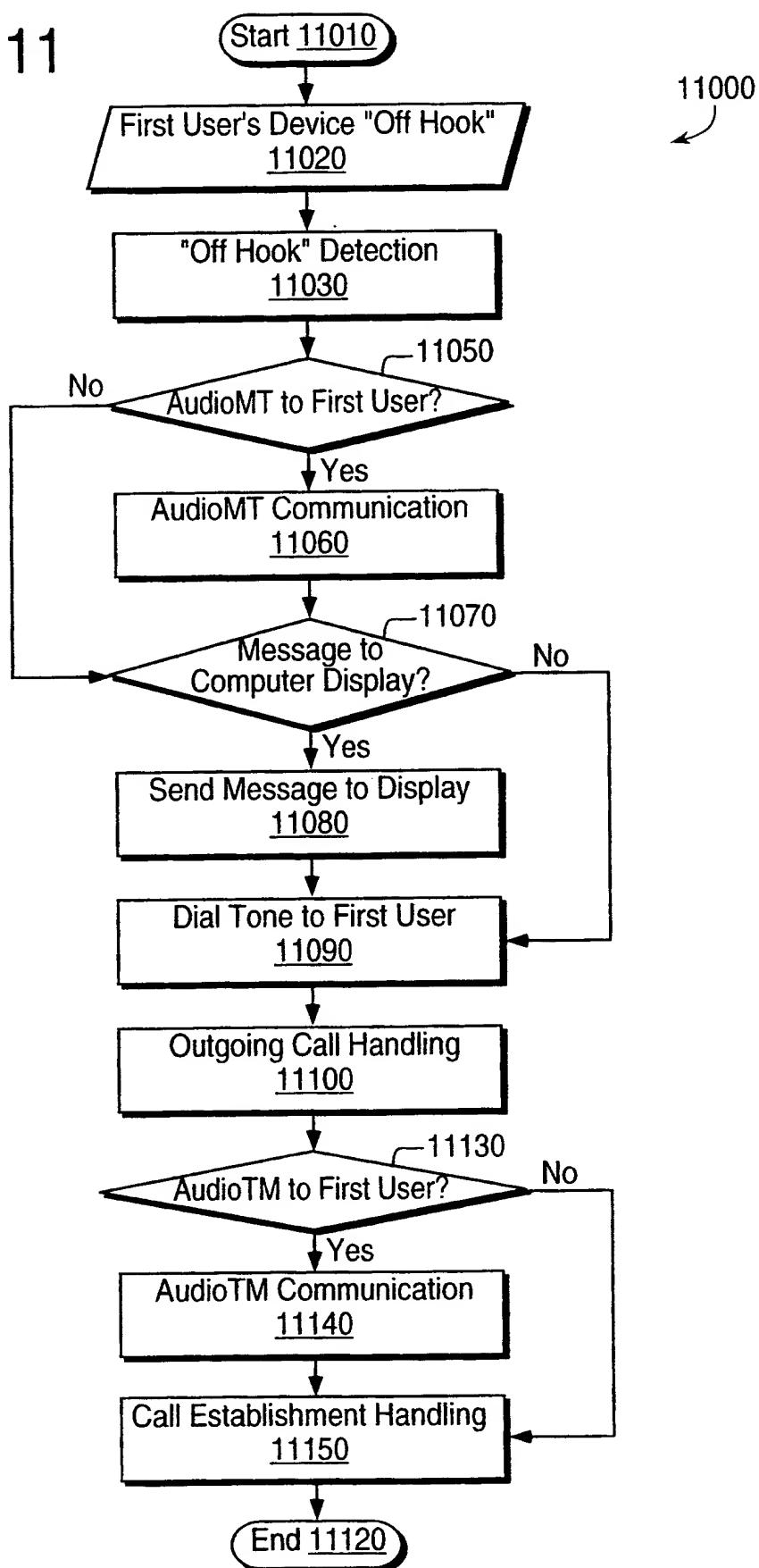


FIG. 10

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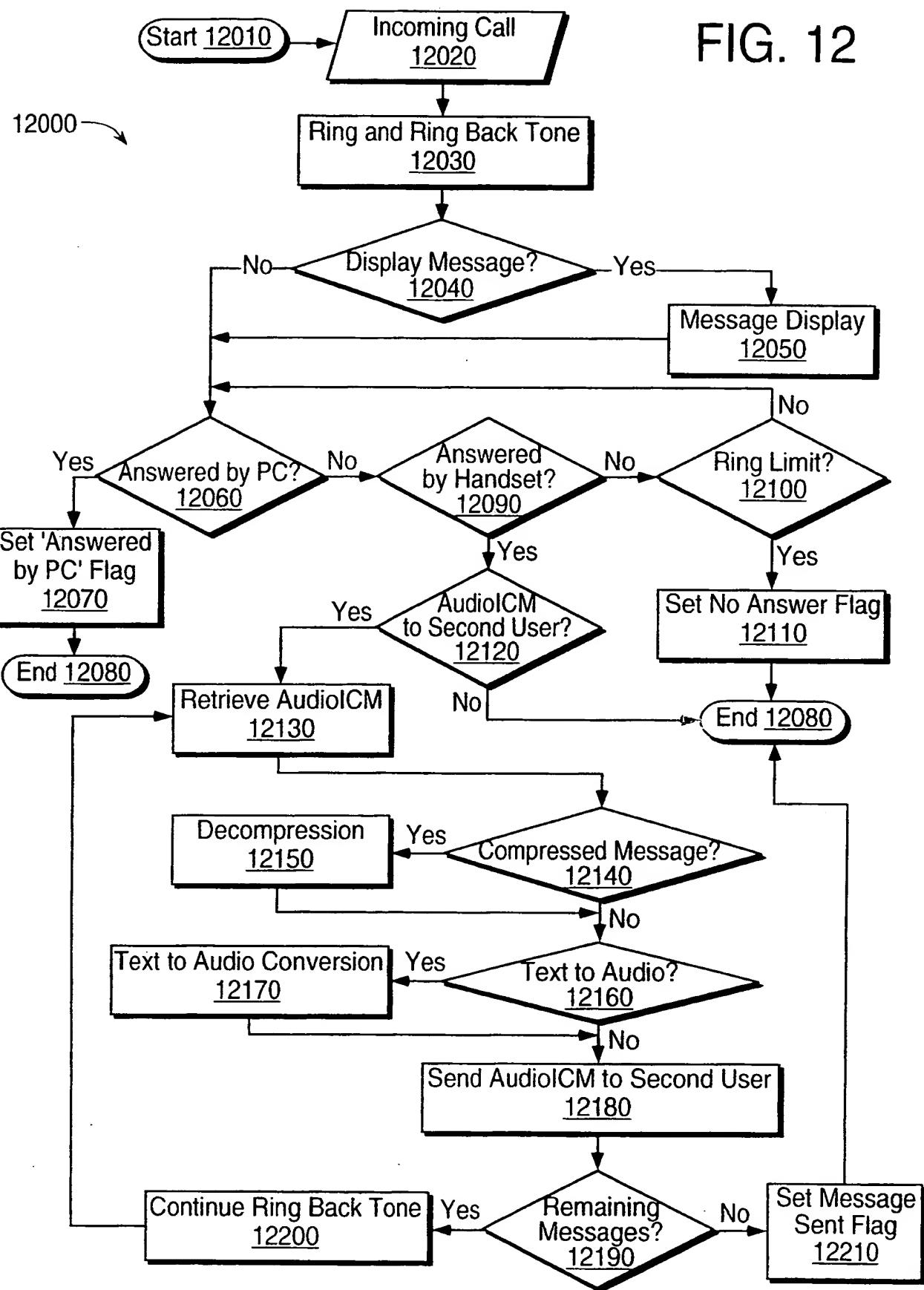
17/22

FIG. 11



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FIG. 13A

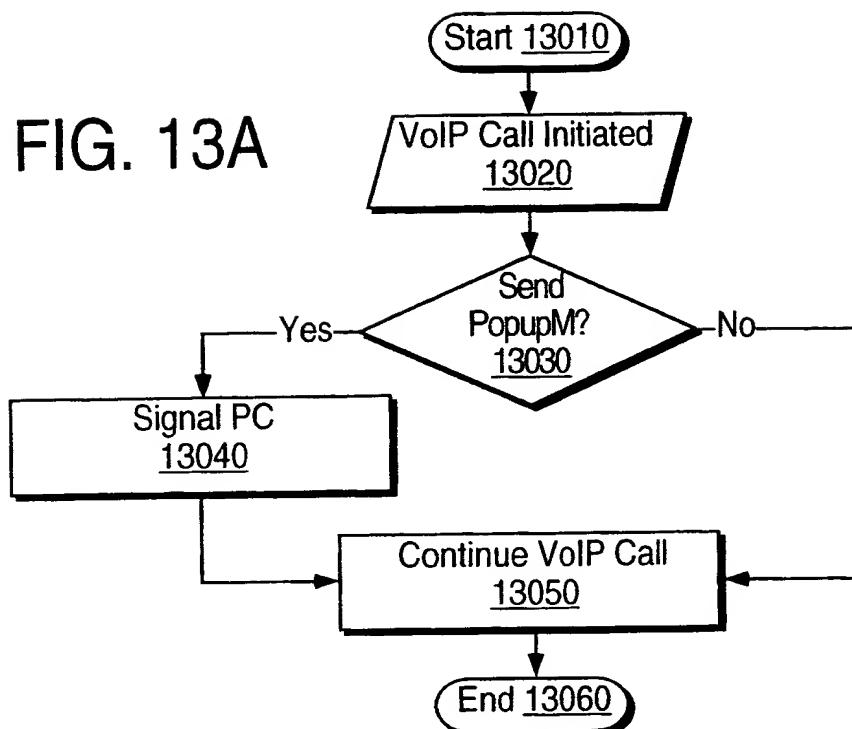
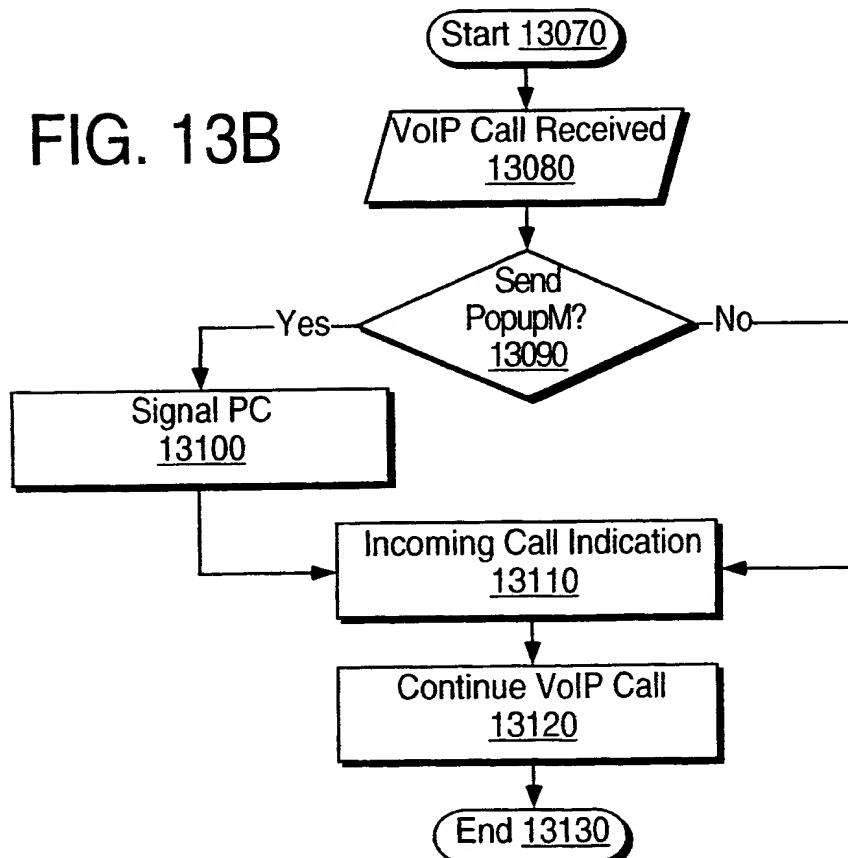


FIG. 13B



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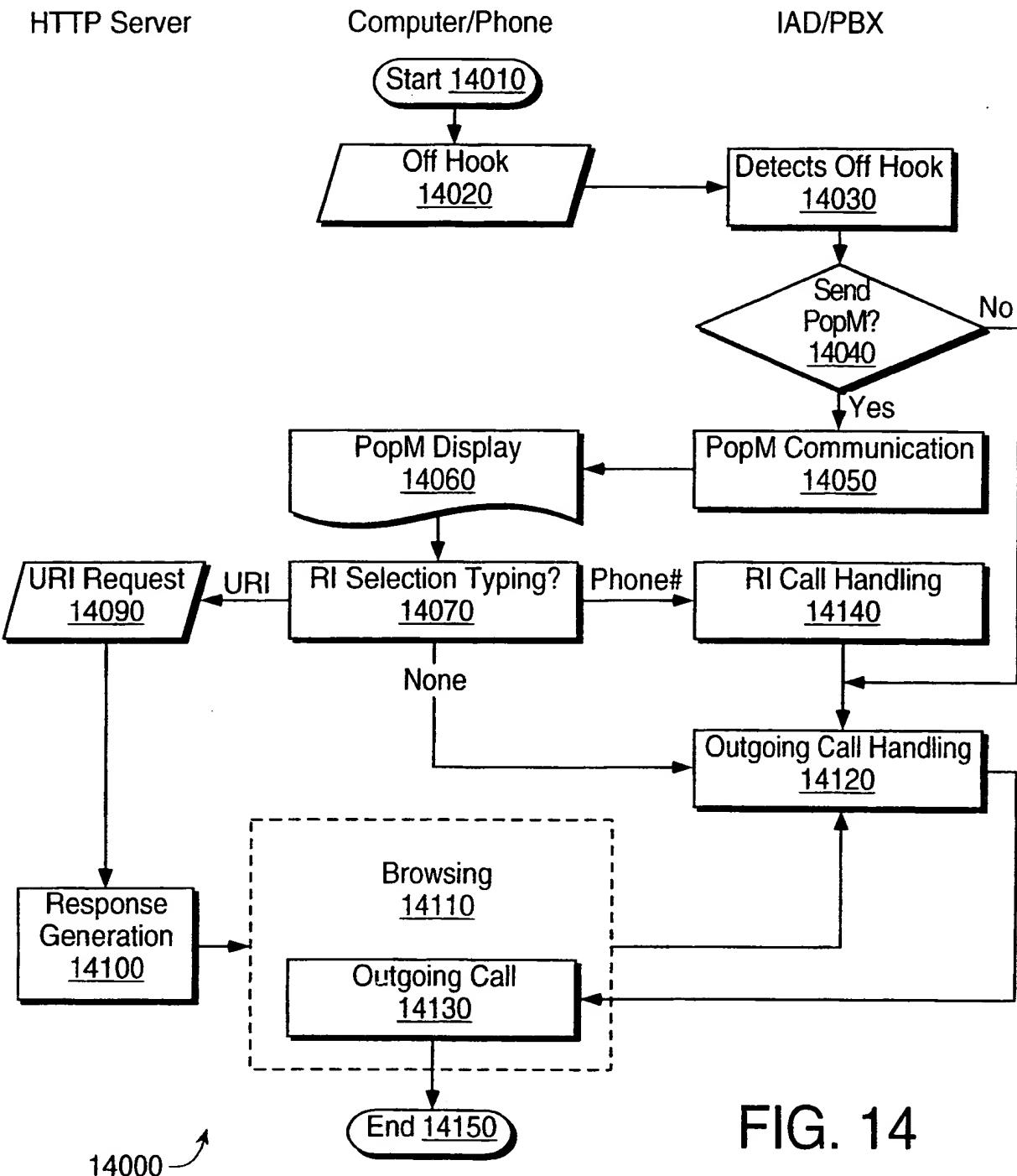


FIG. 14

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INTERNATIONAL SEARCH REPORT

Int. Application No
PCT/US 00/08715

A. CLASSIFICATION OF SUBJECT MATTER
 IPC 7 H04M3/487 H04M7/00 H04Q7/22

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
 IPC 7 H04M H04Q

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

EPO-Internal, WPI Data, INSPEC, PAJ

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	GB 2 206 265 A (AMERICAN TELEPHONE & TELEGRAPH) 29 December 1988 (1988-12-29) A page 2, line 22 - line 32 page 5, line 4 - line 14 page 7, line 7 - line 10 ---	1-6,8,9, 12,19, 20, 23-27, 29,40 46,48, 52,55, 59,67, 77,84,93
X	US 5 652 784 A (STEINVORTH RANDOLPH H ET AL) 29 July 1997 (1997-07-29) column 1, line 36 - line 46 abstract ---	1-3 -/-

Further documents are listed in the continuation of box C.

Patent family members are listed in annex.

* Special categories of cited documents :

- "A" document defining the general state of the art which is not considered to be of particular relevance
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- "O" document referring to an oral disclosure, use, exhibition or other means
- "P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

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"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.

"&" document member of the same patent family

Date of the actual completion of the international search

Date of mailing of the international search report

19 September 2000

27/09/2000

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Vandevenne, M

INTERNATIONAL SEARCH REPORT

International Application No

PCT/US 00/08715

C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	WO 91 06187 A (DUFOUR JEAN PIERRE) 2 May 1991 (1991-05-02) page 5, line 31 - line 37 ---	40
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